Appendix H

Haile Gold Mine EIS

Reclamation Plan

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HAILE GOLD MINE
RECLAMATION PLAN

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ATTACHMENTS

LIST OF ACRONYMS AND ABBREVIATIONS

ac-ft	Acre Feet
ARD	Acid Rock Drainage
CWTP	Contact Water Treatment Plant
CY	Cubic Yards
DHEC	South Carolina Department of Health and Environmental Control
ft amsl	Feet Above Mean Sea Level
Haile	Haile Gold Mine, Inc.
HDPE	High Density Polyethylene
HGMC	Haile Gold Mine Creek
ML	Metal leaching
MSHA	Mining Safety and Health Administration
NPDES	National Pollutant Discharge Elimination System
OMP	Overburden Management Plan
PAG	Potentially Acid Generating
PMP	Probable Maximum Precipitation Event
Romarco	Romarco Minerals, Inc.
SCDNR	South Carolina Department of Natural Resources
TSF	Tailing Storage Facility
WAD	Weak Acid Dissociable

EXECUTIVE SUMMARY

The Haile Gold Mine Reclamation Plan is primarily conceptual in nature at this time; it describes the general procedures and methods for achieving the final reclamation requirements and objectives. In addition, the Reclamation Plan serves as a basis for calculating reclamation costs, identifying long-term post-reclamation monitoring and maintenance requirements, and determining financial assurance. As mining activities at the Haile Gold Mine progress, the Reclamation Plan will be continuously refined and expanded, while adhering to the concepts outlined in this document. Detailed reclamation project information will be provided to the South Carolina Department of Health and Environmental Control in advance of conducting the reclamation described in this Reclamation Plan. Appropriate financial assurance will be provided for proposed reclamation and closure activities to ensure that funds for reclamation and closure are available.

Due to its past reclamation successes at the Haile Gold Mine Site, Haile has good experience and understanding of the reclamation process, including what vegetation can and will grow at the Site. During mining operations, Haile will take every opportunity to perform reclamation concurrent with operations. Concurrent reclamation will be performed on disturbed areas once all planned mining activities in the area are completed and no future mining activity is expected. Final reclamation will be completed as soon as practicable after mining activities cease at the facility. Haile will also conduct post reclamation and closure monitoring and maintenance.

1 INTRODUCTION

1.1 Purpose and Objectives

The Haile Gold Mine Reclamation Plan (Reclamation Plan) has been developed to meet the requirements of Section 48-20-90 of the South Carolina Mining Act. The Reclamation Plan is designed to describe methods used to reclaim land disturbed by mining, ore processing operations, and associated activities to a stabilized condition that will provide for the long-term protection of land and water resources, minimize the adverse impacts of mining, and support the intended post-mining land use. The Reclamation Plan meets all applicable regulatory requirements. This version of the Reclamation Plan provides an update to the previous reclamation plan (SWS, Reclamation Plan, December 2010).

1.2 Project Description

Gold was discovered in the area in the late 1820s. Figure 1 presents the general location of the Haile Site, approximately three miles northeast of the Town of Kershaw in Lancaster County, South Carolina. Open pit and underground mining operations continued sporadically until the early 1990s. Approximately 360,000 ounces of gold were mined and processed during this time period. In 1992, Amax Gold Inc. and the Piedmont Mining Company formed Haile Mining Company. Due to the economic conditions at the time, Amax Gold Inc. did not proceed with mining operations. Kinross Gold Corporation acquired the Site in 1998 and was conducting reclamation activities when Romarco Minerals, Inc. (Romarco) acquired the property in late 2007.

Romarco, through its subsidiary Haile Gold Mine, Inc. (Haile), has conducted extensive exploration and is currently in the process of permitting activities for reopening the mine. The mine plan includes eight open pits, seven overburden storage areas (OSA), one tailing storage facility (TSF), four growth media storage areas, a Mill and processing facility, and other ancillary facilities to support mining and processing activities. Many of the proposed mine facilities will be located at the site of historic mine pits and other previous mining facilities.

The plan view Site map in Figure 2 presents the proposed facilities and configuration at the end of mine life, prior to final reclamation and closure activities. Figures 3 and 4 show post-reclamation and closure at the Site.

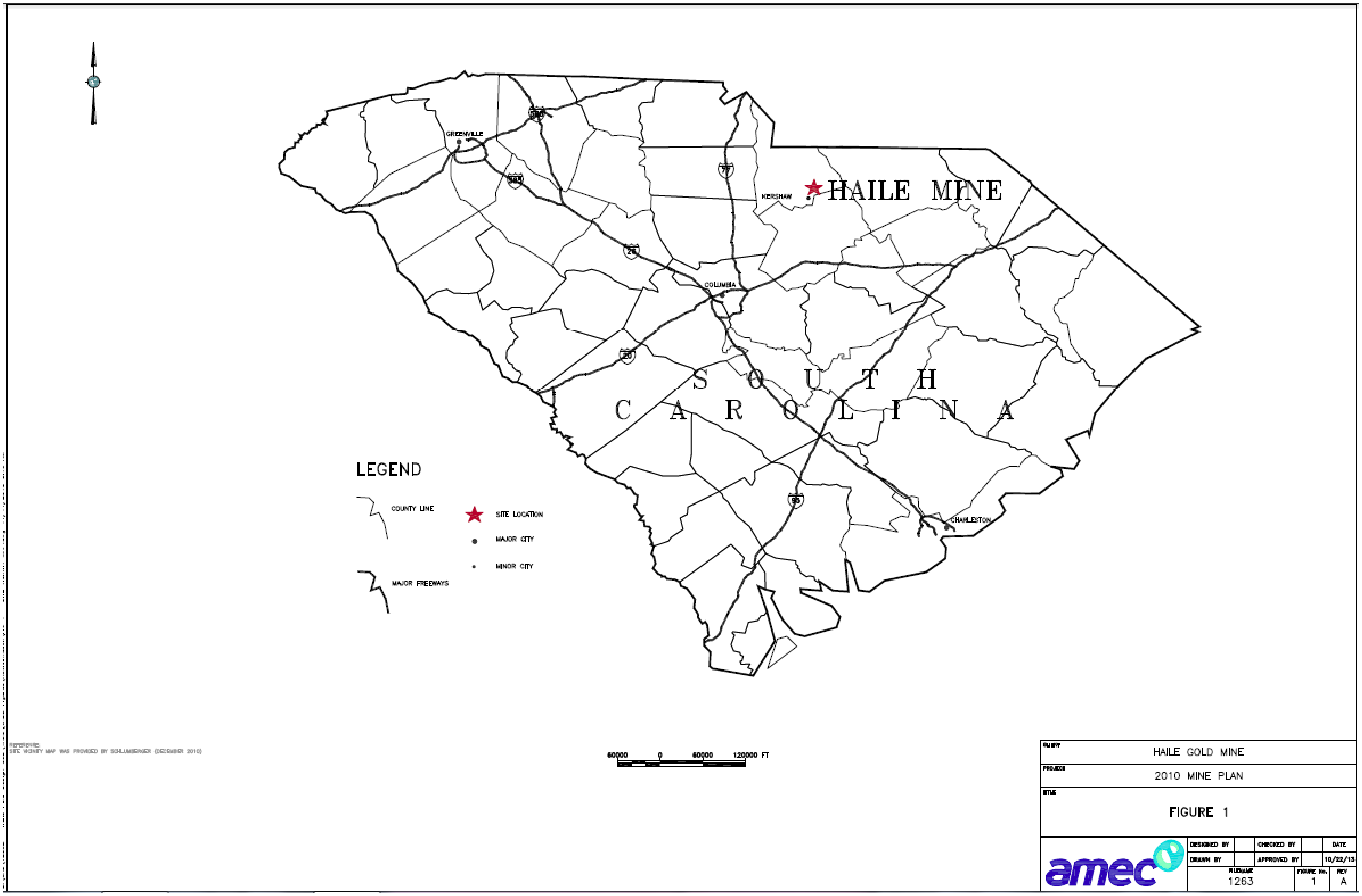


Figure 1. Site Vicinity Drawing

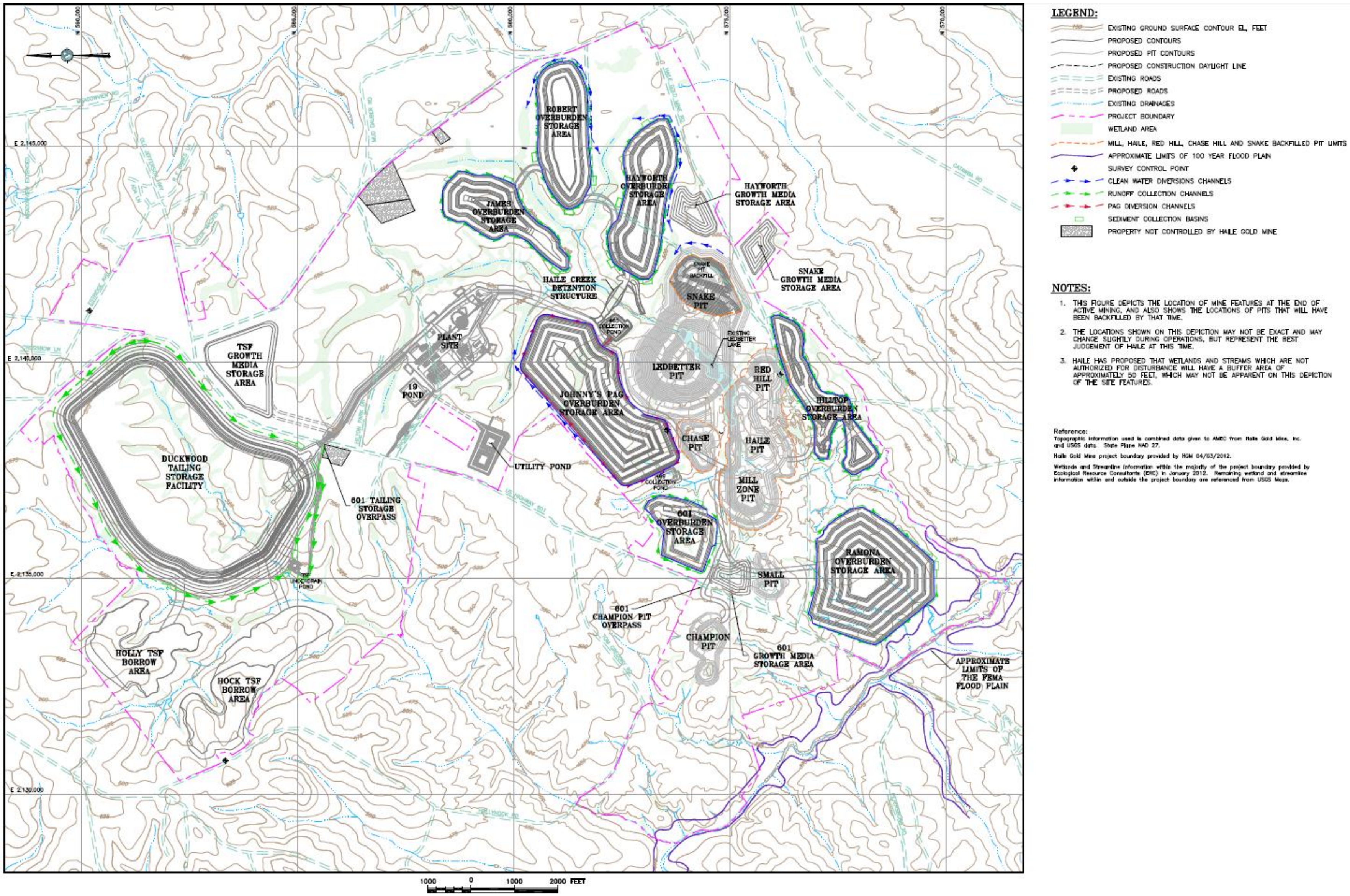


Figure 2. Proposed Project – Plan View of the Project Area

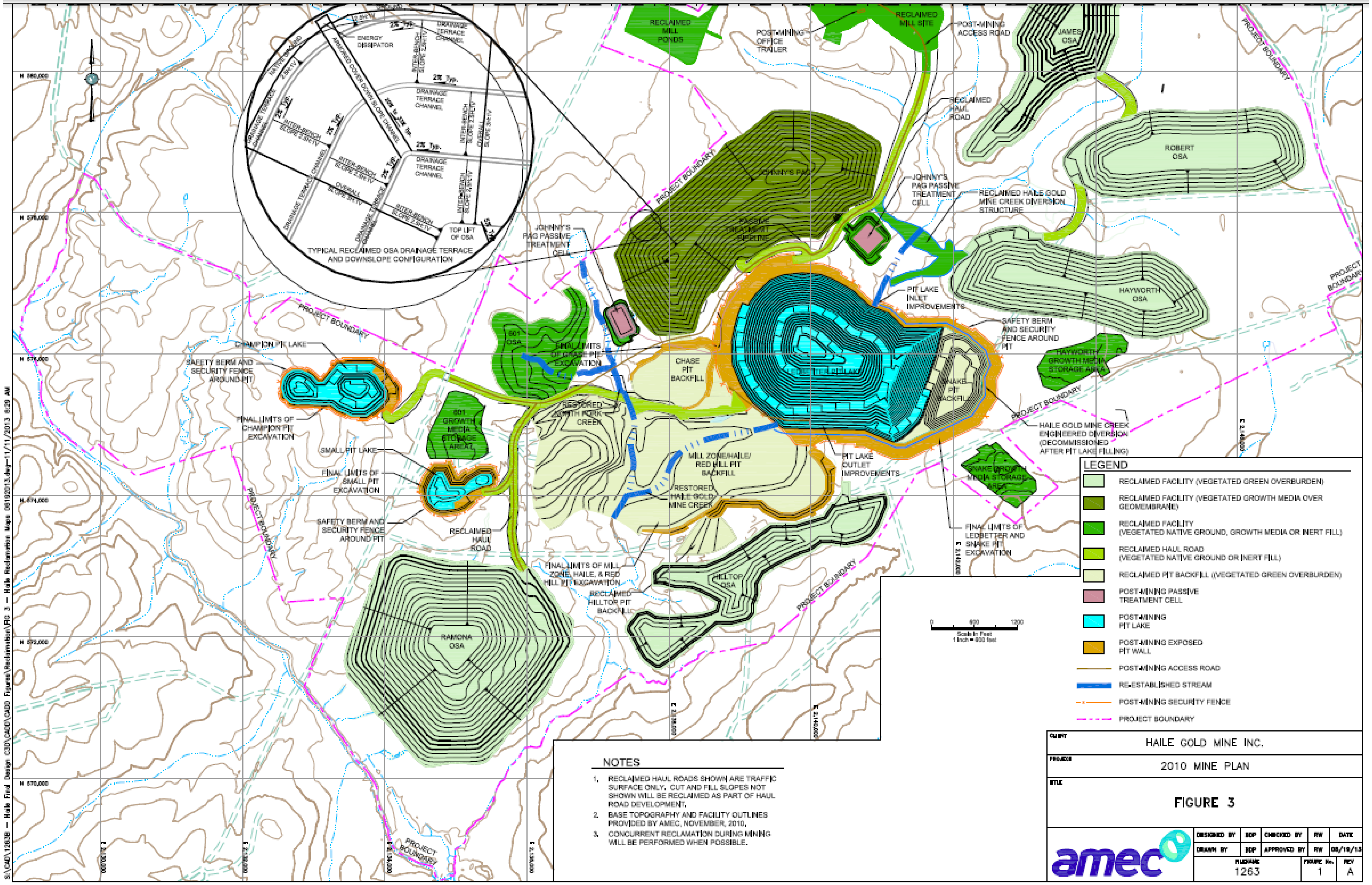


Figure 3. Post-Reclamation and Closure

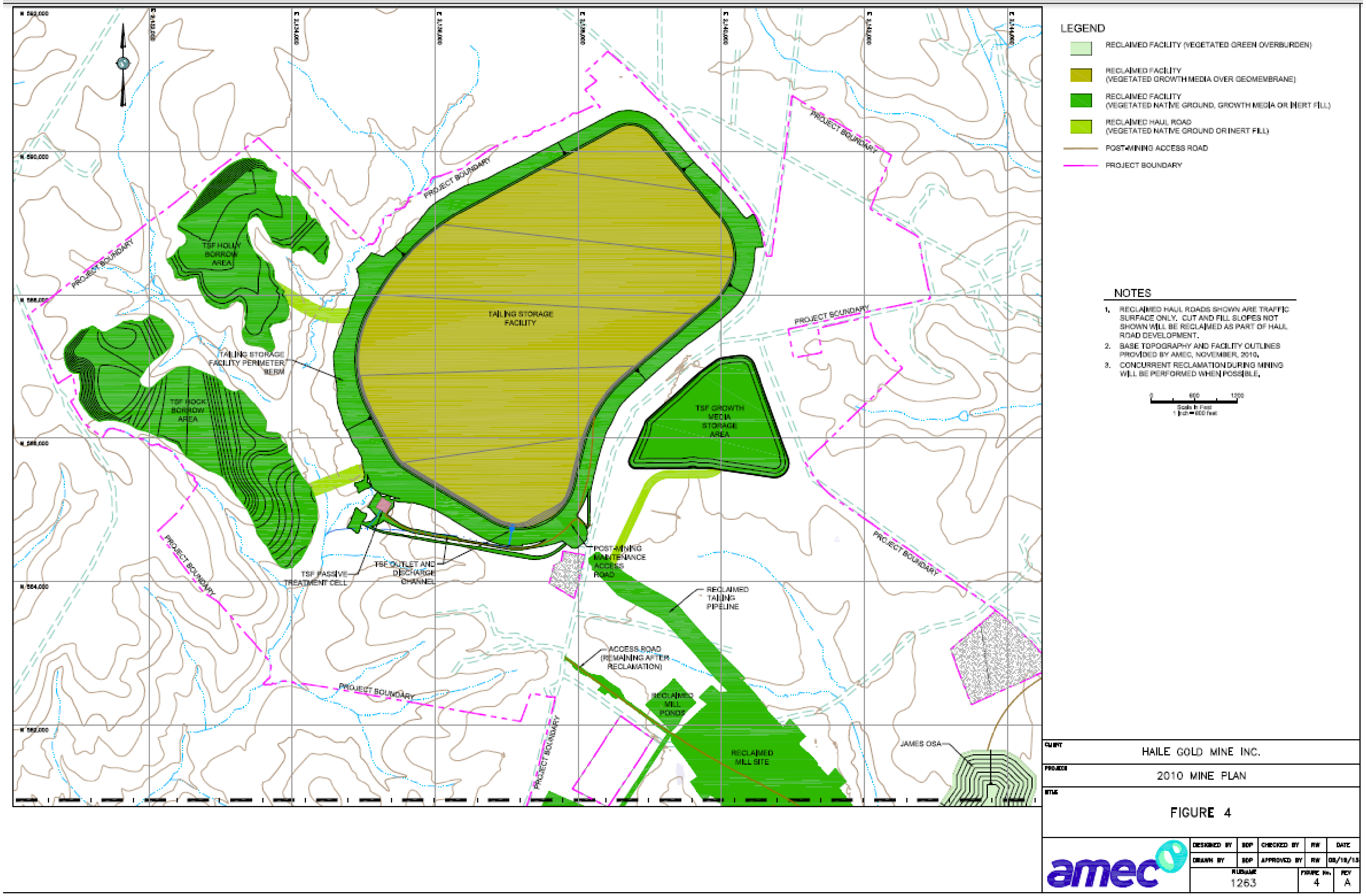


Figure 4. Post-Reclamation and Closure

1.3 Physical Setting

The Haile Site is located at 34° 34’ 46’’ N latitude and 80° 32’ 37’’ W longitude. The mine permit area encompasses approximately 4,552 acres. Within this area, approximately 2,612 acres will be disturbed under the mine plan.

The Project area is characterized by gentle topography and rolling hills, dense networks of stream drainages, and red-brown saprolite soils. Soil data for the areas that may be used as sources for the growth media material shows the majority of the growth media material in this area is composed of Blanton Sand. *See* Appendix A (AMEC, Soil Erosion Modeling Report (Aug. 2013)).

The Site topography is the result of dissection by two northeast to southwest-flowing streams, Haile Gold Mine Creek (HGMC) and Camp Branch Creek and by their generally southeast and northwest-flowing tributaries. The Haile Site is located primarily within the Southeastern Plains (Level III)-Sandhills (Level IV) ecoregion with the southern portions of the Site located within the Piedmont (Level III)-Carolina Slate Belt (Level IV) ecoregion (Grifith et al. 2008). The Haile Site is located within the Lynches subbasin watershed - Hydrologic Unit Code (HUC) 03040202.

HGMC is the principal stream at the Site. The HGMC drainage basin is approximately 3,000 acres (about 4.65 square miles) and is comprised of small drainage areas that divide the Site. Camp Branch Creek is the second main stream through the proposed mine. It has a drainage basin of approximately 2,700 acres (about 4.17 square miles) and includes numerous small tributaries. HGMC basin drains into the southeast-flowing Little Lynches River approximately one mile southwest of the Site and two miles downstream from the confluence of Camp Branch Creek and Little Lynches River. The Little Lynches River, in turn, drains into the Lynches River. A portion of the property is developed (with reclaimed/revegetated mine features) and is wooded with both natural and logged pine and hardwood forests. The elevation of the Site ranges from 350 feet above mean sea level (ft amsl) to 550 ft amsl.

2 RECLAMATION REQUIREMENTS

2.1 Site-Wide Reclamation Plan

The Haile Gold Mine Reclamation Plan describes the reclamation of disturbed land from mining and ore processing operations to a stabilized condition that will provide for the long-term protection of land and water resources for post-mining land uses. Additional goals include:

- Reducing the environmental impacts of mining;
- Utilizing concurrent reclamation where appropriate throughout the mining process;
- Minimizing the need for long-term active water management requirements through the conversion to and use of passive treatment technology at the Tailing Storage Facility (TSF) and Johnny's Potentially Acid Generating (PAG) Overburden Storage Area (OSA);
- Abating the generation of Acid Rock Drainage (ARD) from the sulfide materials exposed as a result of the mining operations; and,
- Meeting state and federal regulatory requirements.

Refinements to the Reclamation Plan and bond will be provided to the South Carolina Department of Health and Environmental Control (DHEC) in accordance with SC Mining Regulation 89-200.

During mining operations (i.e., Years 0-14 of the Mine Schedule) Haile will perform aspects of the final reclamation activities as part of operational activities. This concurrent reclamation is planned for stabilization and vegetation of the outboard slopes of the TSF and all green OSAs, backfill and reclamation of certain mine pits, and grading and reseeding the Holly and Hock TSF Borrow Areas as well as areas where previously reclaimed facilities were removed. Final reclamation (including reclamation of the TSF, Johnny's PAG, Mill Site, remaining mine pits, and roads) and completion of the remaining revegetation efforts will begin immediately upon cessation of mining and milling operations. Reclamation will be completed as expeditiously as practicable and in compliance with SC Mining Regulations 89-80.B: "Reclamation shall be conducted simultaneously with mining whenever feasible and in any event shall be initiated at the earliest practicable time, but no later than within 180 days following termination of mining on any segment of the mine and shall be completed within two years after completion or termination of mining on any segment of the mine."

2.1.1 Vegetation Plan

Re-establishing vegetation on impacted lands will be essential to preventing erosion, restoring surface stability, providing site productivity, and providing wildlife forage/cover opportunities as well as visual/aesthetic values at the Haile Gold Mine Project Site (Site) during operations and reclamation. The vegetation procedures planned for the Haile Site are based on industry standards, site specific experience in South Carolina, and past reclamation success. The Revegetation Plan is found in Appendix B, including Tables 1 and 2, which provide the proposed seed mixes.

Generally speaking, two seed mixes are proposed to be used at Haile. One is a standard seed mix and the second is a wetland seed mix. Haile is not currently proposing any other plantings. All seed shall be certified noxious weed-free. The standard seed mix was chosen based on species characteristics, varied soil conditions at Site, and the planned land use and maintenance of the area. An annual grass is used in the mix and the specific annual seeds used will change dependent on the time of year the planting is made. The primary goal of revegetation is soil stabilization while a secondary goal is to provide a habitat for wildlife and the natural succession of vegetation. The wetland seed mix will be used where wetlands and riparian areas are part of the reclamation, and will result in a community of palustrine emergent wetland vegetation that will likely transition into the more typical characteristic forested wetland community through natural successional processes.

Based on previous experience at the mine Site, Haile believes that the majority of the disturbed surfaces will be suitable to sustain vegetation without the need to supplement the soil. This assumption will be verified with test plots and vegetative studies during operations. Nonetheless, sufficient growth media will be stockpiled during mine development to fully reclaim the Site in accordance with SC Mining Regulation 89-140. Where Haile, in conjunction with the State, determines that growth media is needed to establish vegetation, material will be withdrawn from these storage areas and used during reclamation activities.

Seeds of some vegetation may survive and be available for regeneration from the stored growth media. Haile's current experience with reclamation at the Site demonstrates that native vegetation will emerge at reclamation sites, wind-borne or from seed stock in the soils.

During the mine operating period, Haile will consult with the South Carolina Department of Natural Resources (SCDNR) and DHEC, establish vegetation test plots and perform other studies to establish, confirm and refine appropriate vegetation species and seeding rates, determine the need for soil amendments, and overall vegetation procedures to ensure sustainable vegetation post-closure for the intended land use.

Opportunities for concurrent reclamation are expected to arise within the first three years of mining activities. Therefore, vegetation studies will begin as soon as practicable following commencement of mining activities. Previous revegetation success and concurrent reclamation activities will be used to refine revegetation techniques throughout the mine life.

2.1.2 Proposed Facilities

The proposed facilities at the Haile Gold Mine that are addressed in this reclamation plan include:

- Backfilled Mine Pits
- Pit Lakes
- Green OSAs
- Johnny's PAG
- TSF
- Mill Site and associated infrastructure

- Site surface water management facilities
- Roads, on-site power lines, and other ancillary facilities

A plan view Site map is presented in Figure 2 with the proposed facilities and presents the proposed Site configuration at the end of mine life, prior to final reclamation and closure activities. A detailed discussion of each facility and the proposed reclamation activities for each facility is presented in Sections 2.3 through 2.11, below.

2.1.3 Post-Mining Land Use

Consistent with the individual locations that will be reclaimed, and as described in Sections 2.3 to 2.11, the goal of Haile's Reclamation Plan is to return the disturbed areas to a stable condition that can support a productive post-mining land use. After reclamation, assuming such uses are consistent with local zoning laws, the majority of the Site will be suitable for other uses (i.e., industrial, commercial, residential, and agriculture & forestry), restored to a natural condition (i.e., vegetated and with re-established wetlands and streams), or reclaimed as pit lakes. Future activities at the TSF and Johnny's PAG will be limited, consistent with post-closure restrictions. *See* Figure 5, below.

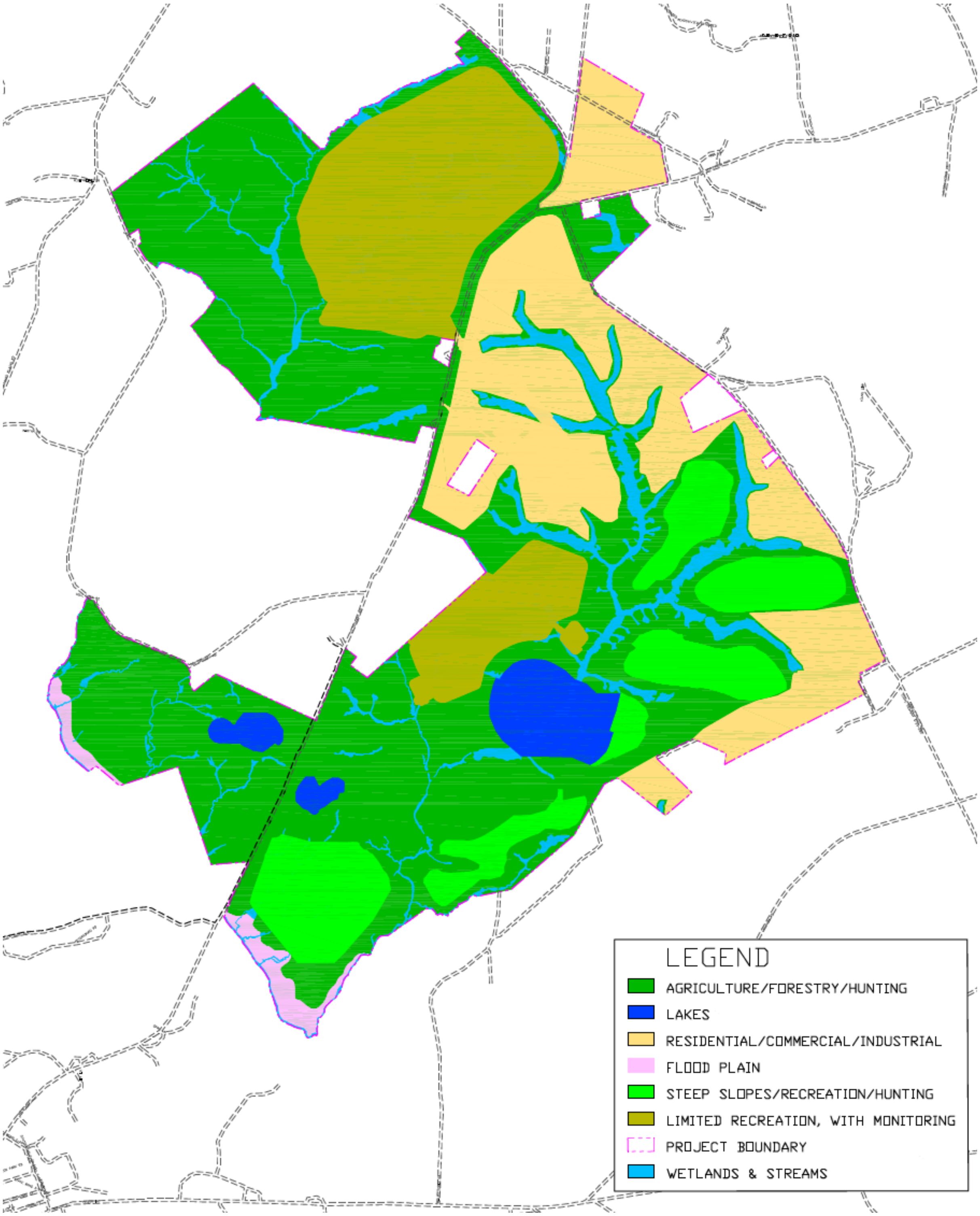


Figure 5. Potential Future Land Use Suitability

2.2 Material Handling Requirements

Haile has prepared an Overburden Management Plan (OMP), Baseline Geochemistry Report (Schafer, 2010a), and Addendums to the Baseline Geochemistry Report (Schafer, 2010b) (Schafer 2012) (Schafer 2013a). These documents address the identified significant differences in the acid generating potential and metal leaching risk of different rock units at the Haile Site. Overburden materials were further subdivided into the material classes defined in Table 1. The OMP presents a plan for classifying overburden based upon its acid generating potential, and was used as a guideline for developing operational procedures and reclamation methods to identify, manage, and mitigate the geochemical risk of adversely impacting surface and groundwater resources.

Table 1 Overburden Classification at Haile

Operational Testing Criterion	Abundance	Characteristics	Proposed Management
Red PAG - strongly acid generating overburden			
Laminated Unit, Sulfide S > 1% and NNP < -31 (or NAG pH <2.5)	About 38 % of Laminated Unit	When oxidized, contact water will have low pH (< 3.0) and very high metals, sulfate and acidity (>5,000 mg/L)	Stored in geomembrane encapsulated PAG cell, placed in lifts, compacted and Saprolite-lined outside perimeter to reduce oxygen
Yellow PAG - moderately acid generating overburden			
Sulfide S between 0.2 and 1.0% and NNP between -31 and 0 (or NAG pH between 2.5 and 4.5)	About 22 % of Laminated Unit, 6% of Metavolcanic unit, and 5% Saprolite	If allowed to oxidize, contact water will have low pH (3.0 to 4.0) and low to moderate metals (mostly Fe & Al)	Managed as Red PAG early in mine life before completing first pit, then placed in lifts with lime (as needed) as subaqueous pit backfill
Green Overburden - not acid generating			
Less than 0.2 % sulfide S or NNP > 0 (or NAG pH > 4.5)	About 40 % Laminated Unit, 94 % Metavolcanics, 95% Saprolite and all Coastal Plain Sand	Contact water may have moderately acidic to alkaline pH (4.0 to 8.0), sulfate low (<1,000 mg/L) metals non-detectable.	Placed in unlined OSAs. Runoff will not require treatment assuming it meets stormwater requirements as expected
Possible Subdivisions of Green Overburden Unit			
Inert Rock Overburden	Most metavolcanic rock	pH generally near-neutral, and metals not detectable.	Placed in unlined areas or used for embankment construction. Plant growth media if suitable soil properties
Saprolite	Top 100 feet or more of deposit	Material is high in clay and will have moderately low pH due to extensive weathering	Placed in unlined areas, used for embankment construction, possible plant growth media
Acid neutralizing Rock (NAG pH > 8.0),	Around 15 % of Laminated Unit and	Material will remain alkaline and will neutralize acidity.	Possible co-disposal strategy to ameliorate Acid Drainage risk of

	Metavolcanics samples, NNP usually +25 to +150 kg/t	Some Laminated Unit samples may contain appreciable sulfides and may release sulfate, zinc, other base-soluble metals	other materials

S Sulfur
NAG Net Acid Generating
NNP Net Neutralization Potential

2.3 Backfilled Mine Pits

The identified reserve at the Haile Gold Mine Site will be extracted from eight mine pits: Mill Zone, Snake, Haile, Red Hill, Ledbetter, Chase, Champion and Small. The final excavation of Mill Zone, Haile, and Red Hill will form the South Pit complex, while Snake and Ledbetter will intersect to form the Ledbetter-Snake Pit complex. The three remaining pits, Chase, Champion and Small will remain as separate pits.

Mill Zone, Haile, Red Hill, and Chase Pits will be completely backfilled with overburden, and the Snake Pit will be partially backfilled with overburden and reclaimed to facilitate post mining land uses. A typical detail of the pit backfill is shown in Detail 1 and Detail 2 on Figure 6. Because this backfilling is done during active mining, it is considered the start of concurrent reclamation for those facilities.

A reclamation approach for each pit has been designed to best suit the location, geometry, and timing of mining within the scope of the current mine plan and reclamation concepts. A description of the reclamation approach for each backfilled mine pit is presented below.

2.3.1 Mill Zone Pit

Mill Zone Pit is the first pit to be mined and forms the western lobe of the South Pit complex. Mining in Mill Zone Pit begins during Pre-Production and extends until the end of Year 2. The entire South Pit complex, which includes the Mill Zone Pit, will be reclaimed as a pit backfill, as discussed in Section 2.3.4. The bottom elevation of the Mill Zone Pit will be approximately 40 ft amsl.

2.3.2 Haile Pit

The Haile Pit forms the center, largest lobe of the South Pit complex. Mining in the Haile Pit begins during Year 3 and extends until the end of Year 7. The entire South Pit complex will be reclaimed as a pit backfill, as discussed in Section 2.3.4. The bottom elevation of the Haile Pit at the completion of mining will be approximately 60 ft amsl.

2.3.3 Red Hill Pit

The Red Hill Pit forms the eastern lobe of the South pit complex. Mining in the Red Hill Pit begins during Year 4 and extends until the end of Year 7. The entire South pit complex will be reclaimed as a pit backfill, as discussed in Section 2.3.4. The bottom elevation of the Red Hill Pit following completion of mining will be approximately 140 ft amsl.

2.3.4 South Pit Complex Backfill Activities

The South Pit complex will be completely backfilled with either yellow or green overburden material to the inundation level during operations.[1]

Placement of overburden in the South Pit complex will generally progress from west to east as the pits are exhausted. As described in the OMP (Schafer, 2010), as yellow overburden material is placed in the pit backfill, the overburden will be amended with lime at a rate of 2 lbs per ton of overburden. This rate is based on current studies of the expected backfill material geochemistry conducted to date and may be adjusted during operations based on on-going sampling and testing of overburden material during mining operations. Lime amendment will assist in neutralizing acid rock drainage that forms within the pit backfill material until depressurization activities cease, and the water level in the pit backfill has risen so as to fully inundate the yellow overburden. Yellow overburden will be placed in the South Pit complex using lift heights no greater than 50 feet. The final lift of Yellow overburden will stop a minimum of 5 feet below the anticipated inundation level (based on historic levels and groundwater modeling). Above the final lift of yellow overburden and below the anticipated inundation level, a minimum of 5 feet of saprolite will be placed to reduce oxygen entry into the backfill. Once water levels in the pit backfill have recovered to the inundation level, the yellow overburden will be permanently submerged, limiting the oxygen available and thereby reducing the potential to generate acid rock drainage. After placement of the upper saprolite lift, the South Pit complex will be backfilled above the inundation level with green overburden (or other inert material) up to an elevation that approximates original topography.

Backfilling the Mill Zone Pit will begin immediately after the Mill Zone Pit ore is exhausted (end of Year 2). Complete backfill of this pit cannot be completed until the western portion of the Haile Pit ore is mined (Year 7). Approximately 47 acres of pit backfill area will require contouring and revegetation during reclamation activities.

Backfilling the Haile Pit will begin immediately after the western portion of the Haile Pit is exhausted (end of Year 7). Due to the advantageous geometry and size of the Haile Pit, backfilling is expected to be completed within one year of cessation of mining. Approximately 40 acres of pit backfill will require contouring and revegetation during reclamation activities.

Backfilling the Red Hill Pit will begin immediately after the Red Hill Pit ore has been mined (end of Year 7). Areas of Red Hill Pit will be reserved to allow placement of yellow overburden backfill into Year 12. Approximately 36 acres of pit backfill will require recontouring and revegetation during reclamation activity.

South Pit Complex Reclamation Activities

Final reclamation of the South Pit complex location will entail reconstructing the North Fork Creek stream channel, see Section 2.6.2, sloping and contouring of the pit backfill as each portion of the backfill is completed, and revegetation. The top of the backfill will be regraded

[1] Anticipated inundation elevations are based on current groundwater conditions and model predictions. However, these elevations may change due to refinements to the groundwater model during operations. Reclamation and closure plans will be updated accordingly.

to minimize impoundment of storm waters and flow concentration. Occasional large boulders that are uncovered during re-grading may be left on the surface to provide topographic diversity, microhabitats for wildlife and vegetation, and to break the linear appearance of the final slope.

The backfilled surface will be seeded using an approved seed mix and appropriate seeding methods. *See* Section 2.1.1, Vegetation Plan. A typical detail of the pit backfill is shown in Detail 1 of Figure 6.

2.3.5 Snake Pit Partial Backfilling

The Snake Pit forms the eastern lobe of the Ledbetter-Snake Pit complex. Mining in the Snake Pit begins during Year 1 and extends until the end of Year 4. Snake Pit will be reclaimed as a partial pit backfill and partially as a part of the Ledbetter Pit Lake. *See* Section 2.4.1, Ledbetter Pit Lake.

Snake Pit backfill will be in direct contact with the Ledbetter Pit Lake, as discussed in Section 2.4.1. The bottom elevation of the Snake Pit will be approximately 80 ft below msl.

Snake Pit Backfill Activities

The eastern portion of Snake Pit will be partially backfilled with green overburden to the inundation level during operations. *See* Figure 6, Detail 2. Only the eastern portions of the pit can be backfilled in order to ensure the safety of mining activities at the bottom of the adjacent Ledbetter Pit. Backfilling activities will begin immediately after ore in the Snake Pit is exhausted (Year 4) and backfill activities will be completed in Year 5. The green overburden backfill in the Snake Pit will be constructed and left at the angle of repose, which is approximately 1.5H:1V. The pit backfill will be constructed with lift heights no greater than 50 feet. Any exterior slopes will be constructed with an overall slope of 3H:1V or flatter through the use of benches and angle of repose inter-bench slopes.

Additional green overburden backfill will be placed above the inundation level. Placement of the green overburden will be constructed at an overall slope of 3H:1V or flatter through the use of benches and angle of repose inter-bench slopes. During or immediately following operations, equipment will push the angle of repose benches down to flatten the inter-bench slopes to 2.5H:1V or flatter.

Final reclamation of the Snake Pit backfill will entail contouring of the green backfill. The top of the backfill will be regraded to minimize impoundment of storm waters and concentration of stormwater flow. Occasional large boulders that are uncovered during regrading may be left on the surface to provide topographic diversity, microhabitats for wildlife and vegetation, and to break the linear appearance of the final slope.

The surface of the Snake Pit partial backfill will be seeded using an approved seed mix and appropriate seeding methods. *See* Section 2.1.1, Vegetation Plan. Approximately 36 acres of pit backfill will be revegetated. The Snake Pit partial backfill is shown on Figure 3. A typical section of the Snake Pit partial backfill is shown in Detail 2 of Figure 6.

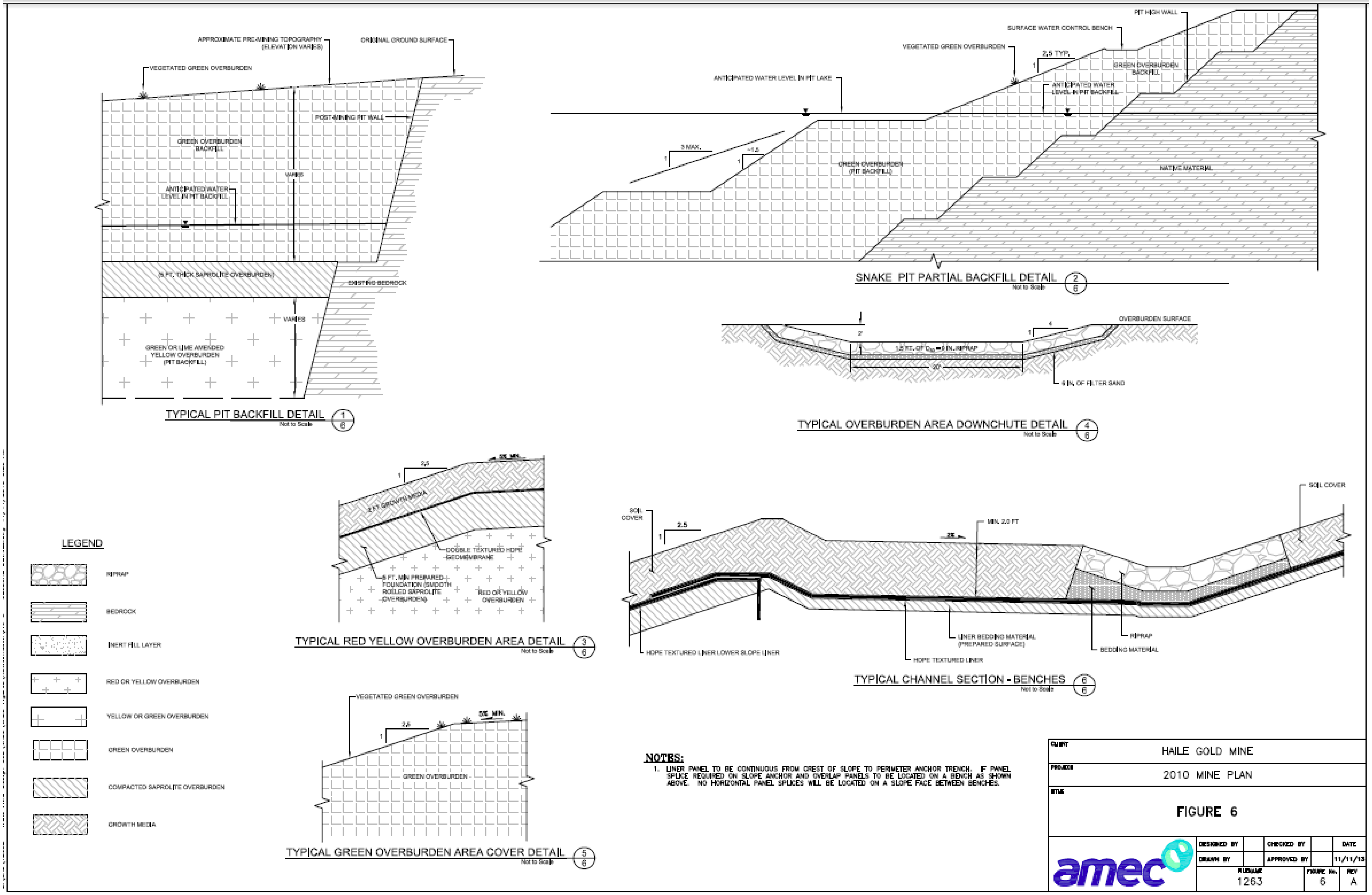


Figure 6. Closure Details

2.3.6 Chase Pit

The Chase Pit is an isolated pit located north of Haile Pit. Mining in the Chase Pit occurs during Years 7 through 10. The Chase Pit will be completely backfilled during operations. The bottom pit elevation in the Chase Pit is approximately 240 ft amsl.

Chase Pit Backfill Activities

Chase Pit will be completely backfilled during operations with yellow or green overburden material to an elevation five feet below the groundwater inundation level. As described in the OMP (Schafer, 2010), as yellow overburden material is placed in the pit backfill, the overburden will be amended with lime at a rate of 2 lbs per ton of overburden. This rate is based on current studies of the expected backfill material geochemistry conducted to date and may be adjusted during operations based on on-going sampling and testing of overburden material during mining operations. Lime amendment will assist in neutralizing acid rock drainage that forms within the pit backfill material until depressurization activities cease, and the water level in the pit backfill has risen so as to fully inundate the yellow overburden. Yellow overburden will be placed in the Chase Pit using lift heights no greater than 50 feet. The final lift of Yellow overburden will stop a minimum of 5 feet below the anticipated inundation level (based on historic levels and groundwater modeling). Above the final lift of yellow overburden and below the anticipated inundation level, a minimum of 5 feet of saprolite will be placed to reduce oxygen entry into the backfill. Once water levels in the pit backfill have recovered to the inundation level, the yellow overburden will be permanently submerged, limiting the oxygen available and thereby reducing the potential to generate acid rock drainage.

Backfilling the Chase Pit will begin immediately after the ore in the pit is exhausted (end of Year 10) and is expected to be completed by the end of Year 12. After placement of the upper saprolite lift, the Chase Pit will be backfilled above the inundation level with additional green overburden up to an elevation that approximates original topography. Approximately 23 acres of pit backfill will be reshaped and revegetated during reclamation activities.

Reclamation Activities

Final reclamation of the Chase Pit backfill will entail sloping and contouring of the pit backfill after backfilling is completed. The top of the backfill will be regraded to minimize impoundment of storm waters and flow concentration. Occasional large boulders that are uncovered during regrading may be left on the surface to provide topographic diversity, microhabitats for wildlife and vegetation, and to break the linear appearance of the final slope.

The backfilled surface will be seeded using an approved seed mix and appropriate seeding methods. *See* Section 2.1.1, Vegetation Plan. A typical detail of the pit backfill is shown in Detail 1 of Figure 6.

2.4 Pit Lakes

Ledbetter, Champion and Small Pits will not be backfilled during operations and will be reclaimed as pit Lakes. As noted above, the portion of Snake Pit that is not backfilled will also be reclaimed as a lake which would become part of the Ledbetter Pit Lake. A safety berm will be constructed around any portions (assumed to be 10%) of the Pit Lakes that did not have these during operations (it is assumed that the pits during operations will be required to have a berm around them except for the ramp that leads into the pits); fences will be added during reclamation. Appropriate signage will be placed at regular intervals on the berm warning of the hazards of the pit highwall and pit lake.

Pit lake water quality studies have been performed based on pre-mining information (Schafer, 2011) (Arcadis, 2012). They indicate that water quality in the Pit Lakes will meet water quality standards. With lime addition, all pit lakes can be maintained consistent with background pH levels. Ledbetter Pit Lake is predicted to require lime addition for 13 years and Champion for 17 years after filling commences. A long-term annual lime requirement will be required at the Small Pit Lake after filling commences. However, once groundwater modeling has been completed, these estimates may be revised.

During operations, as additional information is acquired related to acid generating characteristics of the pit walls and refined groundwater modeling, an additional pit lake study will be performed to refine the predictions of the quantity and water quality of the expected Pit Lakes.

2.4.1 Ledbetter Pit

The Ledbetter Pit forms the western lobe of the Ledbetter-Snake Pit complex. The pit will be developed beginning in Year 4 and is expected to be exhausted in Year 12. At the end of mining, the Ledbetter Pit will have a bottom elevation of approximately 380 feet below msl.

The intersection of Haile Gold Mine Creek and the local groundwater regime indicate that a stable pit lake will form and will limit the generation of acidic drainage from the pit highwalls that are inundated. The estimated oxidation contact within the Ledbetter Pit, which is believed to be the upper extent of acid generating materials, is largely located below the inundation level.

Reclamation Activities

The Ledbetter Pit Lake will collect water from groundwater, direct precipitation, runoff from highwalls, and some surface water diverted from upper Haile Gold Mine Creek. See Section 2.11.7 for a discussion of the Haile Gold Mine Creek Detention and Diversion Structure, which will divert the water. Ledbetter Pit Lake will be filled approximately 20 years after groundwater depressurization pumping ceases at the mine. The inundation level in the Snake Pit will coincide with the Ledbetter Pit Lake level to form a lake of approximately 115 acres in size. A discussion of the Snake Pit partial backfill and reclamation activities associated with the Ledbetter-Snake Pit complex can be found in Section 2.3.5.

The original topography in the vicinity of the Ledbetter Pit will not allow the entire extents of the pit wall to be inundated. A small portion of pit highwall is expected to remain exposed above the final pit lake. The oxidation contact zone in the Ledbetter Pit is shown in Figure 7.

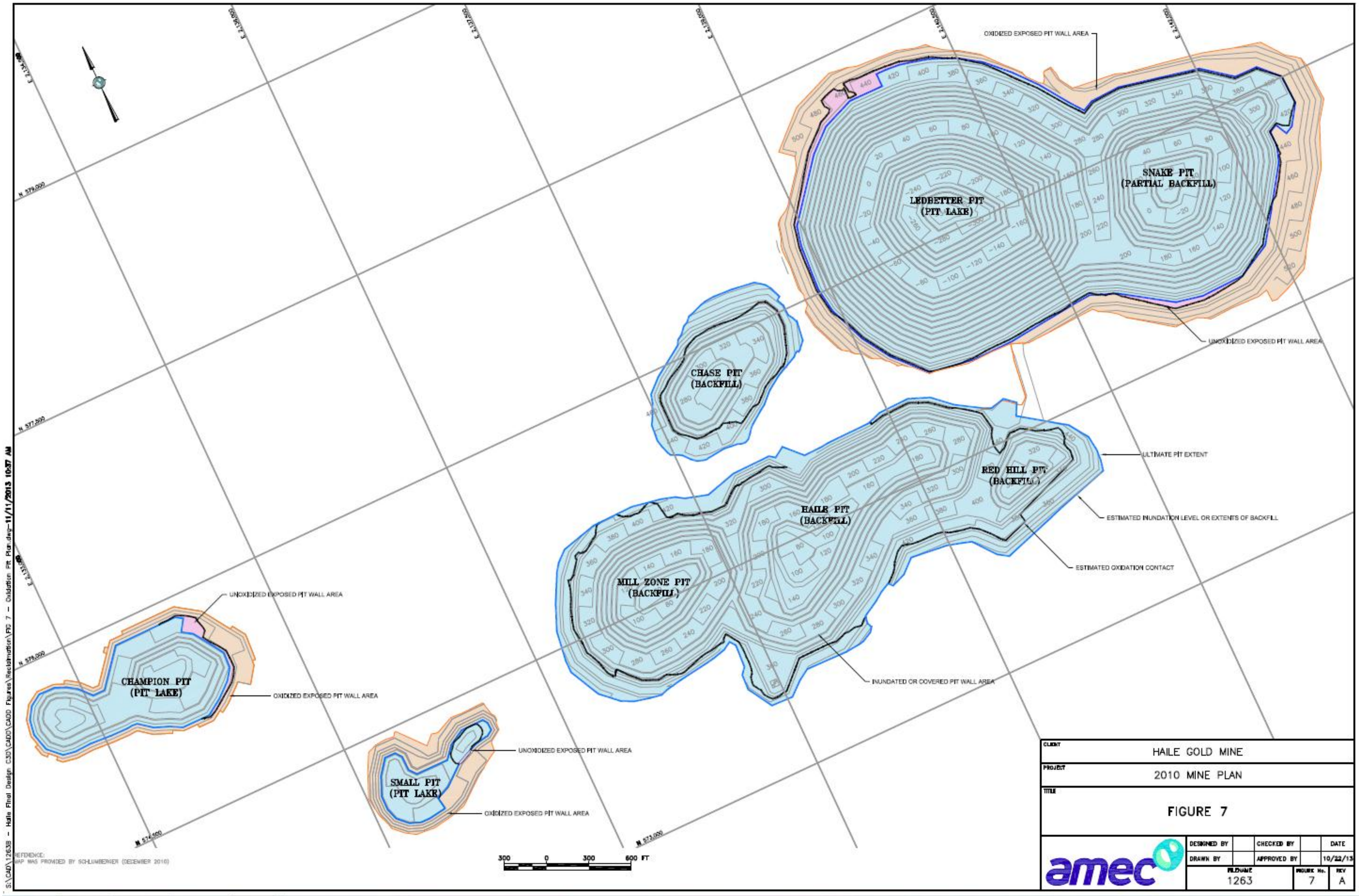


Figure 7. Pit Inundation vs. Estimated Oxidation Contact

Upon the filling of Ledbetter Pit Lake, the low head dam (which will either be a modification to, or in replace of, the Haile Gold Mine Creek Detention and Diversion structure, discussed below in Section 2.11.7) is expected to be removed and all streamflows in Haile Gold Mine Creek will flow into Ledbetter Pit Lake with flows exiting the pit lake through an engineered outlet structure into the re-established downstream channel. The engineered outlet structure will be designed in cooperation with DHEC prior to the Pit Lake being filled. The plan is to allow the upper Haile Gold Mine Creek to flow through the Ledbetter Pit Lake, out of Ledbetter Pit Lake through an engineered outlet structure, into re-established stream channels constructed over the backfilled pits, into the Lower Haile Gold Mine Creek, and into the Little Lynches River. The estimated extent of the Ledbetter Pit Lake is shown in Figure 3.

During pit filling and until stability has been achieved, the pit lake water quality in Ledbetter Pit will be monitored and managed to ensure water quality meets applicable requirements. Lime will be added, as necessary, to maintain the Pit Lake similar to background pH levels. Haile currently estimates that a total of 15,969 tons of lime will be added over the course of 13 years.

2.4.2 Champion Pit

The Champion Pit will be located to the northwest of the Small Pit. Excavation of this pit will begin in Year 9, with the cessation of mining expected to occur in Year 11. At the end of mining, the Champion Pit bottom elevation will be approximately 260 ft amsl.

Reclamation Activities

The Champion Pit Lake will collect water from groundwater, direct precipitation, and runoff from highwalls, but not from surface water diversion. The Pit Lake will approach its equilibrium water level in approximately 20 years and, upon filling, will outflow into groundwater only. Groundwater from the Champion Pit Lake will flow towards the Little Lynches River. The Champion Pit Lake level will form a lake of approximately 17 acres in size.

The original topography in the vicinity of the Champion Pit will not allow the entire extent of the pit wall to be inundated. A small portion of pit highwall is expected to remain exposed above the final pit lake.

The pit lake water quality in Champion Pit will be monitored and managed to ensure water quality meets applicable requirements. Lime will be added initially, as necessary, to maintain the Pit Lake consistent with background pH levels. Haile currently estimates that a total of 4,545 tons of lime will be added over the course of 17 years after the pit lake begins filling. The extent of the Champion Pit and the estimated pit lake extent are shown on Figure 3.

2.4.3 Small Pit

The Small Pit will be located west of the Mill Zone Pit. Excavation of this pit will begin in Year 11 and is expected to be the last active pit at the mine, with the cessation of mining expected to occur in Year 12. At the end of mining, Small Pit will be a pit lake with a bottom elevation of approximately 380 ft amsl and a rim elevation of approximately 470 ft. amsl.

Reclamation Activities

The Small Pit Lake will collect water from groundwater, direct precipitation, and runoff from highwalls, but not from surface water diversion. The Pit Lake will approach its equilibrium water level in approximately 20 years and, upon filling, will outflow into groundwater only. Groundwater from the Small Pit Lake will flow towards the Little Lynches River. The Small Pit Lake level will form a lake of approximately 5 acres in size.

The original topography in the vicinity of the Small Pit will not allow the entire extent of the pit wall to be inundated. A small portion of pit highwall is expected to remain exposed above the final pit lake.

The pit lake water quality in Small Pit will be monitored and managed to ensure water quality meets applicable requirements. Lime will be added, as necessary, to maintain the Pit Lake consistent with background pH levels. Haile currently estimates that a total of 900 tons of lime will be added over the course of 50 years. The extent of the Small Pit and the estimated pit lake extent are shown on Figure 3.

2.5 Overburden Storage Areas

Upon cessation of mining at the Haile Gold Mine Site, the OSAs will contain approximately 154 million tons of overburden materials and 4.9 million tons of low grade ore (at Johnny's PAG) (IMC 2010). Figure 2 illustrates the location of Johnny's PAG and the 601, Ramona, Hilltop, Hayworth, Robert, and James OSAs. All red overburden material will be placed in Johnny's PAG. Yellow overburden will also be placed in Johnny's PAG when pit backfill capacity is not available (i.e., early in the mine plan before the completion of the Mill Zone Pit). All other OSAs will receive only material characterized as green overburden. Based on the current mining schedule, OSA development is scheduled as shown in the Table 2. Final reclamation of the individual OSAs can begin as soon as active placement of overburden on each individual facility ceases. Haile will also concurrently reclaim inactive portions (areas that have met their target capacity) of the OSAs that will not be subject to future disturbance and can do so without adversely impacting mining operations or operator safety. All of the green OSAs are anticipated to be reclaimed and closed prior to the end of mining and milling operations in Year 14 of the Mine Schedule.

Table 2 OSA Development

OSA	Material Classification	Year Begin Construction of Facility	Final Year of Placing Overburden	Final Disturbance Footprint
Johnny's PAG	Red/Yellow	0*	12	159
601	Green	0	6	0**
Ramona	Green	0	7	150
Robert	Green	1	2	81
James	Green	2	3	66
Hayworth	Green	3	5	86
Hilltop	Green	3	4	63

* Represents the Pre-Production period.
** All the material in the 601 OSA will be removed for construction of the TSF during operations thus the final footprint will be 0 acres. However prior to removal of the material the footprint will be 42 acres, which will require reclamation.

A general approach for reclamation of the overburden facilities is described below. Additional details related to the individual OSAs are presented in the following sections.

- Concurrent regrading of OSA slopes from benched angle of repose slopes at overall 3H:1V to inter-bench 2.5H:1V slopes, followed by installation of storm water controls and revegetated, as can be performed without impacting operations. Approximately 50 percent of an overburden area can be concurrently reclaimed in this manner while active operational placement occurs on other portions of the overburden area.
- All OSAs will be revegetated using an approved seed mix and appropriate seeding methods.
- Construction of storm water conveyance channels to direct storm water off the regraded OSA face.
- Final reclamation of the OSAs will minimize impoundment of storm water. The top of the OSA will be sloped towards a number of armored storm water conveyance channels constructed on each OSA to move stormwater off of the OSA while minimizing erosion.
- The reclaimed green OSAs will have steep slopes and will have potential future land use of recreation/hunting.
- Construction of a low permeability closure cover on Johnny's PAG.
- Placement of growth media on the top surface of Johnny's PAG.
- Future land use of Johnny's PAG will consistent of limited recreation, with monitoring.

2.5.1 Johnny's PAG Overburden Storage Area

Johnny's PAG OSA (referred to as Johnny's PAG) is located northwest of the Ledbetter Pit. Johnny's PAG will contain all the red overburden and any yellow overburden material that is not placed in the pit backfills (see Section 2.3). Additionally, material from prior mining operations, including spent ore from the existing Chase and South Heap Leach Pads and existing passive cell material will be placed in Johnny's PAG. Material from existing overburden facilities and backfill material from previously backfilled pits that are within the proposed pit footprints will be placed in Johnny's PAG, unless the material is suitable for placement in the "green" OSAs. (These existing facilities include overburden areas 188, and Snake Dump; and backfilled pits Gault, Haile, Red Hill, Chase, Blauvelt/Bequelin, Snake and Champion). In addition, Johnny's PAG will be used to temporarily store low grade ore (see Section 2.11.6). The low grade ore will be stockpiled closest to the Mill with the remaining area on Johnny's PAG sized to accommodate PAG overburden storage.

Johnny's PAG will be constructed with an 80-mil thick, HDPE geomembrane liner underlain with low permeability soils in order to contain and route seepage and runoff waters to two HDPE-lined collection ponds (the 465 and 469 Collection Ponds) for water treatment. See Figure 8 for a cross section of Johnny's PAG underdrain collection system. The HDPE liner would be overlaid with two (2) feet of sand, to protect the liner during operations and removal of the low grade ore stockpile for processing at the Mill. Collection channels are built within the HDPE-lined facility and surround Johnny's PAG to divert untreated surface runoff and seepage from the PAG to HDPE-lined collection ponds that have been sized to capture the 100-year 24-hour precipitation event. Groundwater would be routed under Johnny's PAG to avoid contact via collection pipes that would be installed below the low- permeability soil liner to route groundwater from beneath the facility (see Figure 8 below). The ultimate footprint of Johnny's PAG would be approximately 159 acres and built to a maximum toe–to-crest height of approximately 250 feet.

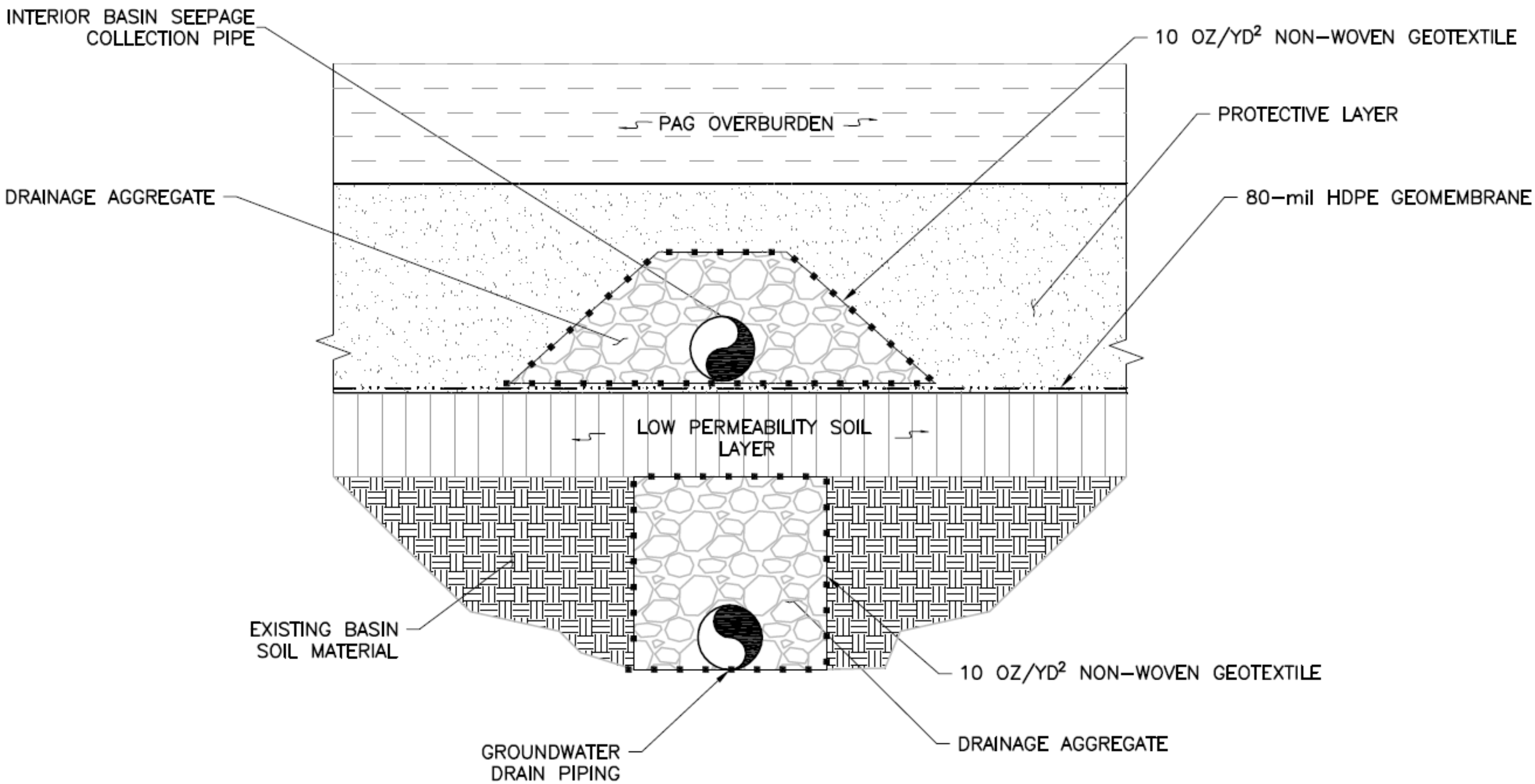


Figure 8. Cross Section of Johnny's PAG Groundwater Drain and Seepage Collection System

Red PAG will be placed in lifts not more than 50 feet in height. The outside perimeter of each bench will contain a minimum 20 foot wedge of saprolite. Also, the top of each bench will be compacted. These measures will help minimize oxygen and meteoric water entry/infiltration into the pile.

Final Grading

During placement of material on Johnny's PAG the overall slope will be constructed at 3H:1V or flatter through the use of benches and angle of repose inter-bench slopes. During operations, mine equipment will push the angle of repose benches down to flatten the inter-bench slopes to 2.5H:1V or flatter. Benches will remain to provide runoff control and limit erosion on the slope face. Any portion – estimated to be approximately 50% – of the PAG that can be safely accessed without impacting overburden placement will be regraded in this manner concurrent with mining activities.

Once final reclamation has begun, any remaining regrading will be performed to achieve the above configuration on the overburden slopes. Additionally, access ramps will be removed or reduced, the top surface will be regraded to promote drainage and minimize erosion, and any additional surface water controls features that are needed for post-closure will be shaped into the overburden surface. Specifically, the benches will be graded to slope back towards the 2.5:1 slope to collect the stormwater in the drainage terrace channel, which directs the flow towards the armored downslope channel off of the PAG. *See* Figure 3 insert area. Regrading will ensure that the saprolite cover placed over the top and sides of the facility remains intact. During final grading, large boulders that are uncovered during sloping will be buried or removed to ensure a smooth surface for liner placement.

Geomembrane Foundation Preparation

The top surface of the regraded PAG will be covered with a minimum five (5) feet of saprolite cover. This top cover along with the 20 foot wedge of saprolite cover on the perimeter slopes and benches will function as the foundation for the geomembrane liner. The geomembrane foundation will be prepared and smooth rolled to provide an even surface for the geomembrane placement. The saprolite cover will be inspected prior to placement of the liner to remove or bury sharp rock protrusion that may damage the liner.

Geomembrane Cover

The entire surface of Johnny's PAG will be covered with a double textured HDPE geomembrane to limit the infiltration of water and restrict oxygen movement. The geomembrane will be anchored as necessary to provide suitable stability on the OSA slopes and will be sealed to the geomembrane liner exposed at the base of the PAG. Approximately 7.4 million square feet of liner will be required to cover Johnny's PAG.

Growth Media and Vegetation

The geomembrane will be covered with a minimum of two (2) feet of growth media to protect the geomembrane from damage, UV radiation, freezing, and to provide a soil layer for establishing vegetation. Material from growth media storage areas will be placed on the liner using low ground pressure equipment to avoid damage to the geomembrane. The final surface will be vegetated with an approved seed mix and established seeding methods. *See* Section 2.1.1, Vegetation Plan. Haile will minimize and control woody growth on Johnny's PAG via chemical application (i.e., spot spraying) and/or mechanical (i.e., bush hogging) every two to five years, or as otherwise required by DHEC.

For a cross-section of Johnny's PAG after reclamation, see Figure 9.Approximately 545,307 cubic yards (CY) of growth media will be required to cover Johnny's PAG and 169 acres will require revegetation. Detail of the Johnny's PAG closure cover is shown in Figure 9, and on Details 5 and 6 of Figure 6.

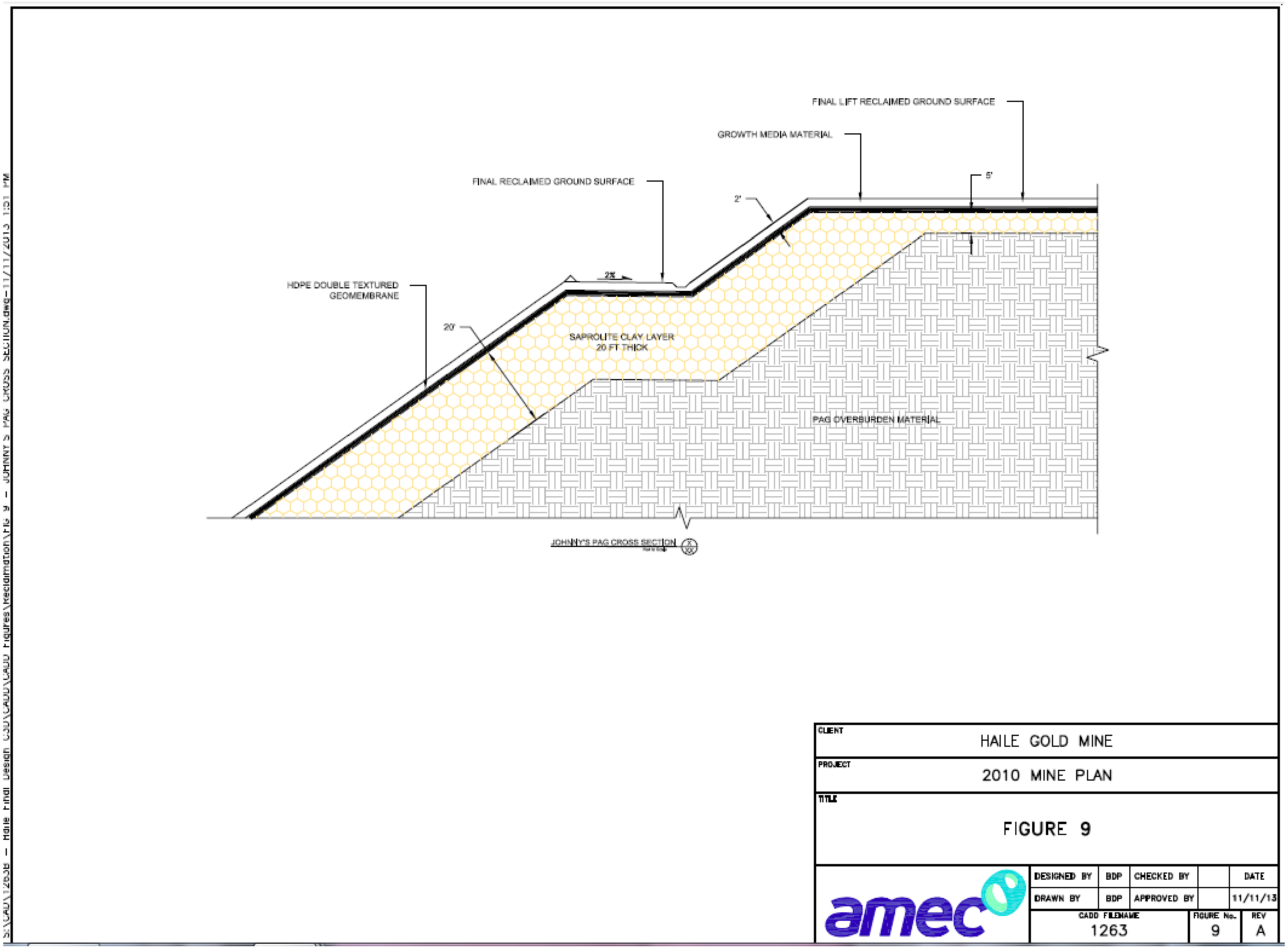


Figure 9. Cross Section of Johnny's PAG Reclamation

Surface Water Controls

During final grading, the surface will be graded to convey runoff from the top and benches towards armored channels located at multiple locations on the PAG. The grading will allow the geomembrane to be placed on the foundation while the full thickness of growth media can be maintained under riprap and filter zone of the channels so that runoff from the PAG can freely enter the channel. Approximately 5,220 feet of armored channel and energy dissipaters will be required to convey surface water flows from the PAG. A typical bench and channel configuration is shown on Figure 3. A typical detail of a PAG/OSA downchute channel is shown in Detail 4 of Figure 6.

Post-closure Water Treatment/ Passive Treatment Cell

After the geomembrane cover is installed in Year 15 of the Mine Schedule and infiltration into the PAG is cut off, seepage from Johnny's PAG is anticipated to report to the HDPE-lined 465 and 469 Collection Ponds at a low flow rate and be of poor quality for an extended duration. However, the quantity of seepage is expected to decrease quickly once the HDPE cover is installed and additional precipitation is prevented from infiltrating the PAG material. Haile anticipates that the long term treatment of this reduced flow will be performed using a passive treatment facility, and that Johnny's PAG will transition to a passive treatment system in Year 20 of the Mine Schedule. Unless and until the flow is capable of being treated by passive technology, Haile will use the on-Site Contact Water Treatment Plant (CWTP) to treat and discharge the seepage from Johnny's PAG.

Construction and operation of the proposed passive wastewater treatment facility is regulated by the DHEC. In accordance with SC Regulations 61-67 (Standards for Wastewater Facility Construction), a permit is required prior to commencement of construction of treatment facilities. This permit application must include the engineering design and demonstrate the capability of the system to meet the effluent limitations for the Land Application Permit. Upon completion of construction, and after a final inspection by DHEC, a permit to operate must be issued prior to commencing the passive treatment operation.

Haile expects that these passive treatment systems, constructed within the HDPE-lined 465 and 469 Collection Ponds, will treat the seepage using an anaerobic (no-oxygen) treatment cell filled with organic media containing beneficial bacteria followed by an aerobic (with oxygen) polishing treatment cell and discharge to Haile Gold Mine Creek. *See* Figure 3. The 465 and 469 Collection Ponds currently proposed for Johnny's PAG will each be of sufficient size to contain a passive treatment system capable of addressing the effluent from their portion of the PAG.

Passive systems use gravity to move the water. Due to the passive (no pumping) nature of the system, the maintenance is expected to be minimal. The media in the cells may require replacement every 20 years or so, depending on the functionality of the cells.

2.5.2 Green OSAs

There are six OSAs proposed for the Haile Gold Mine that will contain only green overburden material or other inert materials produced by the mine as shown in Figure 2: Ramona, Hayworth, Hilltop, James, Robert and 601 OSAs. Once placement on any green OSA has ceased, final reclamation of that facility will begin according to the schedule shown in Tables 4 and 5. However, approximately 50 percent of an overburden area can be concurrently reclaimed while active operational placement occurs on other portions of the overburden area. (I.e., by the time Haile has finished filling an OSA, it should already be at least 50% reclaimed).

These green OSAs will be constructed in phases, as dictated by the generation of green overburden material during mine operations.

Final Grading

During placement of material on the green OSAs, the overall slopes will be constructed at 3H:1V or flatter through the use of benches and angle of repose inter-bench slopes. During operations, mine equipment will push the angle of repose benches down to flatten the inter-bench slopes to 2.5H:1V or flatter. Benches will remain to provide surface water control to limit erosion from the slope face. Any portion of the OSA that can be safely accessed without impacting overburden placement will be regraded, followed by storm water control installation, and revegetated, in this manner concurrent with mining activities.

Once final reclamation of a facility has begun, any remaining regrading will be performed to achieve the above configuration over the remainder of the OSA slopes. Additionally, access ramps will be removed or reduced, the top surface will be regraded to promote drainage and minimize erosion, and any additional surface water control features that are needed for reclamation will be shaped into the overburden surface. Specifically, the benches will be graded to slope back towards the 2.5:1 slope to collect the stormwater in the drainage terrace channel, which directs the flow towards the armored downslope channel off of the OSA. See Figure 3 insert area by way of example. During final grading, occasional large boulders that are uncovered during sloping may be left on the surface to provide topographic diversity, microhabitats for wildlife and vegetation, and to break the linear appearance of the final slope.

Vegetation

The surface of the OSAs will be seeded using an approved seed mix and appropriate seeding methods. *See* Section 2.1.1, Vegetation Plan. The approximate areas requiring vegetation are shown in Table 3.

Surface Water Controls

Final grading will include sloping and developing the existing benches to convey runoff towards armored channels at multiple locations on the OSAs. The grading will allow runoff from the OSA to freely enter the channel. Estimated channel and energy dissipater lengths to convey surface water flows from the OSA surfaces are shown in Table 3. A typical bench and channel configuration is shown in Detail 6 of Figure 6. A typical detail of an OSA downchute area is shown in Detail 4 of Figure 6.

Table 3 Green OSA Quantities

Overburden Storage Area	Revegetation Area (acres)	Armored Channel Length (ft)
601	42	0
Ramona	160	5500
Hayworth	91	2830
Hilltop	66	2040
James	70	2160
Robert	85	2180

2.6 Site Surface Water Management

The area in and around the Haile Gold Mine Site is characterized by a number of drainages that are tributary to Haile Gold Mine Creek (HGMC), which ultimately flows into the Little Lynches River. The design and location of the mine facilities has focused on minimizing the impact to existing drainages around the Site. However, the South Pit complex, the Ledbetter and Snake Pits, and the Haile Gold Mine Creek Detention and Diversion Structure, will directly impact the main Haile Gold Mine Creek channel and the North Fork Creek channel during operations. One objective of the reclamation plan is to return Haile Gold Mine Creek and North Fork Creek to stable post-mining configurations.

2.6.1 Storm and Contact Water Controls and Routing

The majority of the facilities proposed at the Haile Gold Mine Site are located out of the major drainages of Haile Gold Mine Creek and are generally located near the headwaters of the small drainages tributary to Haile Gold Mine Creek. During initial construction, surface water diversions will be constructed around these facilities to divert non-contact runoff around the facilities and into existing drainages. These channels and or pipelines will be constructed to convey the flows from both run-on and reclaimed facility runoff from the 100-yr, 24-hr storm event. The channels will provide adequate storm water control during operation and reclamation, and may remain in-place, where necessary, as a post-mining feature.

2.6.2 Haile Gold Mine Creek and North Fork Creek

The development and active mining of the Mill Zone, Haile, Red Hill, Snake and Ledbetter Pits will impact stretches of Haile Gold Mine Creek and North Fork Creek. Stream diversions will commence during Pre-Production. The diversion of the North Fork Creek ("North Fork diversion") will be constructed to enable diversion of flow around the Mill Zone Pit and the diversion structure will facilitate construction of the mine haul road that will cross between the Mill Zone Pit and 601 OSA. See Figure 10 below for the general design of the North Fork diversion inlet. Two (2) parallel 24-inch pipelines will be installed through the haul road to collect water immediately upstream from the road. The 24-inch pipelines will be routed around mine workings and convey this diverted water past the Mill Zone Pit.

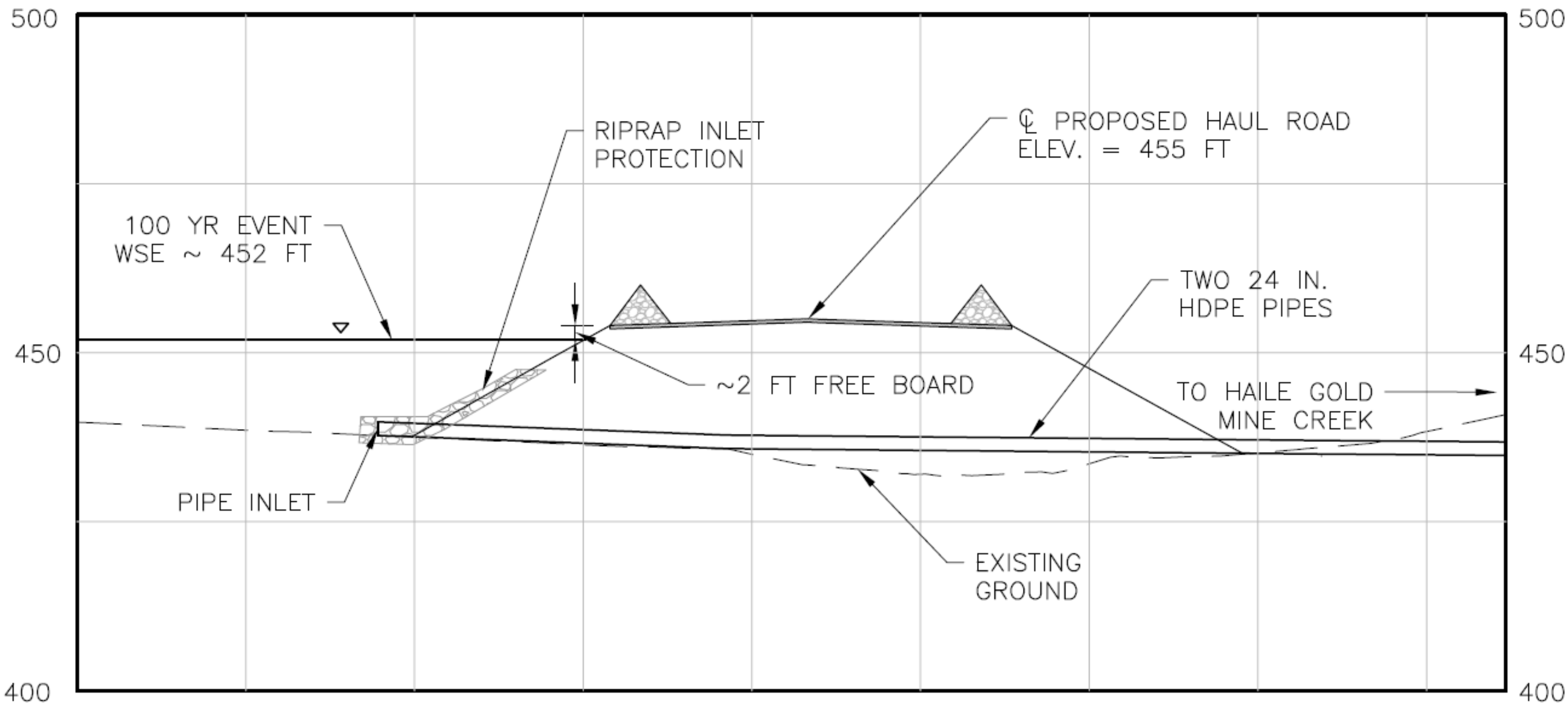


Figure 10. General Design of North Fork Diversion Inlet

From Pre-Production through Year 1, the North Fork is routed east of the Mill Zone Pit in a pipe diversion, from approximately 425 feet above mean sea level (AMSL) down to natural stream grade at approximately 400 feet AMSL. *See* Figures 11 and 12, below.

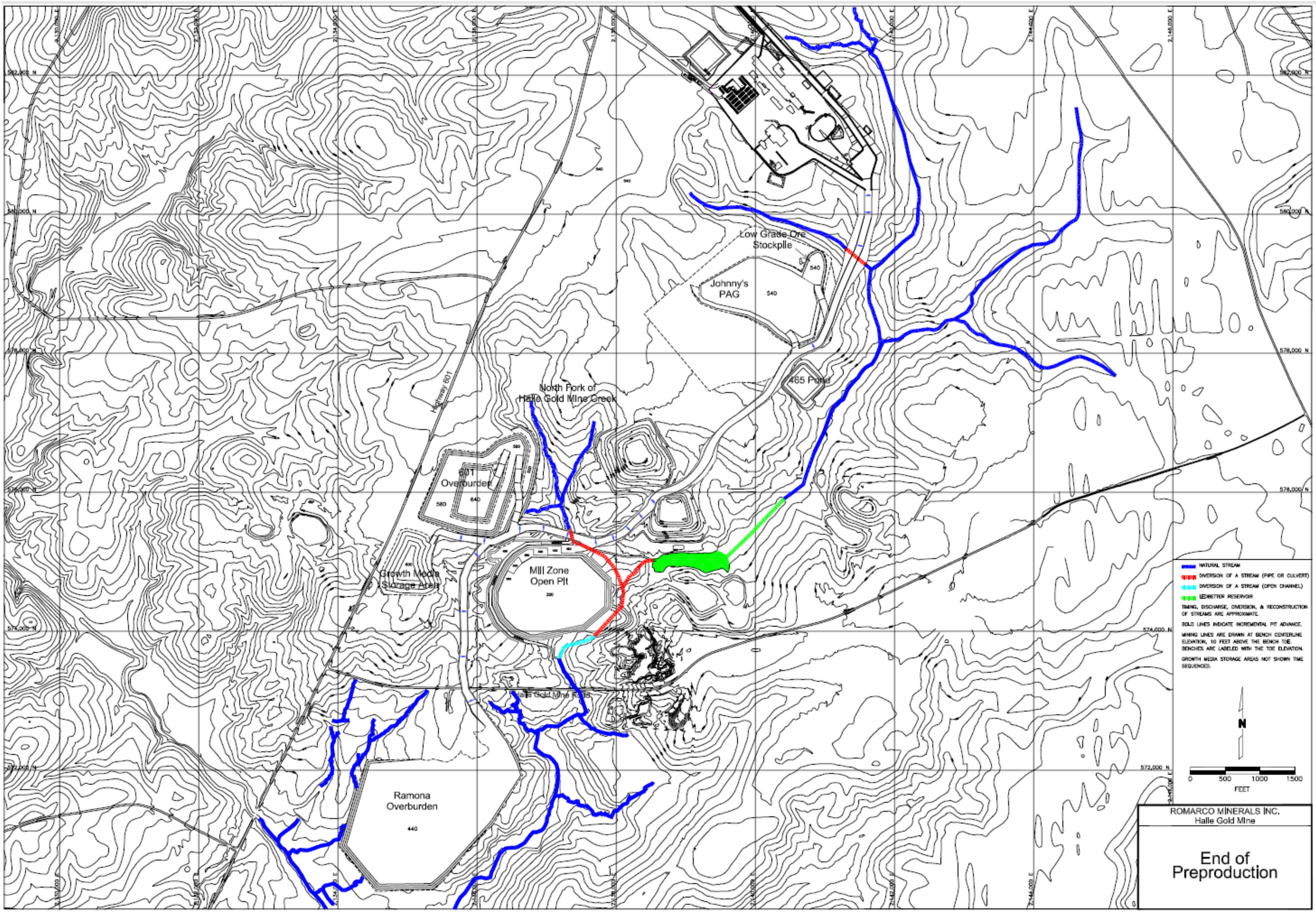


Figure 11. **Location of the North Fork Diversion Established During Pre-Production**

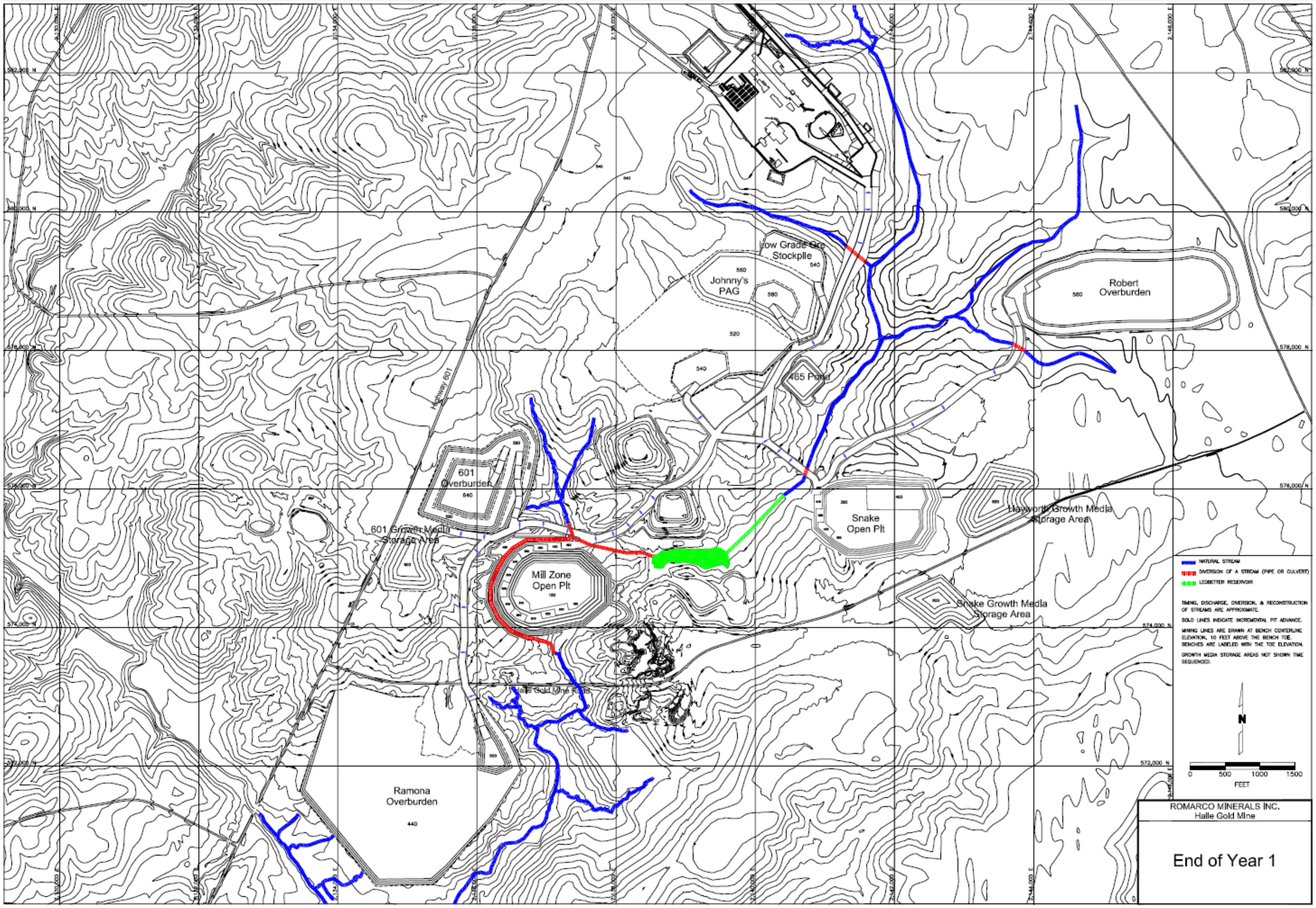


Figure 12 Location of the Diversion Modifications in Place by the End of Year 1

The water level in Ledbetter Reservoir will be lowered commencing in Pre-Production and finishing in Year 3. Flow from Ledbetter Reservoir into lower Haile Gold Mine Creek will be diverted around the Mill Zone Pit area and will be managed with an appropriate diversion control structure.

By the end of Year 1, the North Fork diversion will be moved to the west side of the Mill Zone Pit. Flow in Haile Gold Mine Creek downstream of Ledbetter Reservoir will be diverted into pipes or other appropriate diversion control method that will run parallel to the North Fork diversion until discharge to Haile Gold Mine Creek.

During Year 3, Haile expects that flow of upper Haile Gold Mine Creek through Ledbetter Reservoir will cease, and the diversion of Haile Gold Mine Creek around Snake Pit planned for the remaining mine life will commence. The diverted flow is expected to run through pipes that will be connected to the outlet works at the Haile Gold Mine Creek Detention and Diversion Structure and will be routed along a wide bench (typically 50-foot, to accommodate service trucks along with the piping) that will run along the east perimeter of the Snake Pit. These pipes will be routed from the Snake Pit past the south side of the former Ledbetter Reservoir, and they will run parallel to the North Fork diversion pipes that are around the west side of the Mill Zone Pit and then flow into the natural drainage of Haile Gold Mine Creek downstream of the active mining pits. As described in subsequent years, the diversion piping will be moved but the ultimate point of release into natural channels of Haile Gold Mine Creek does not change during mining. *See* Figures 13 and 14, below.

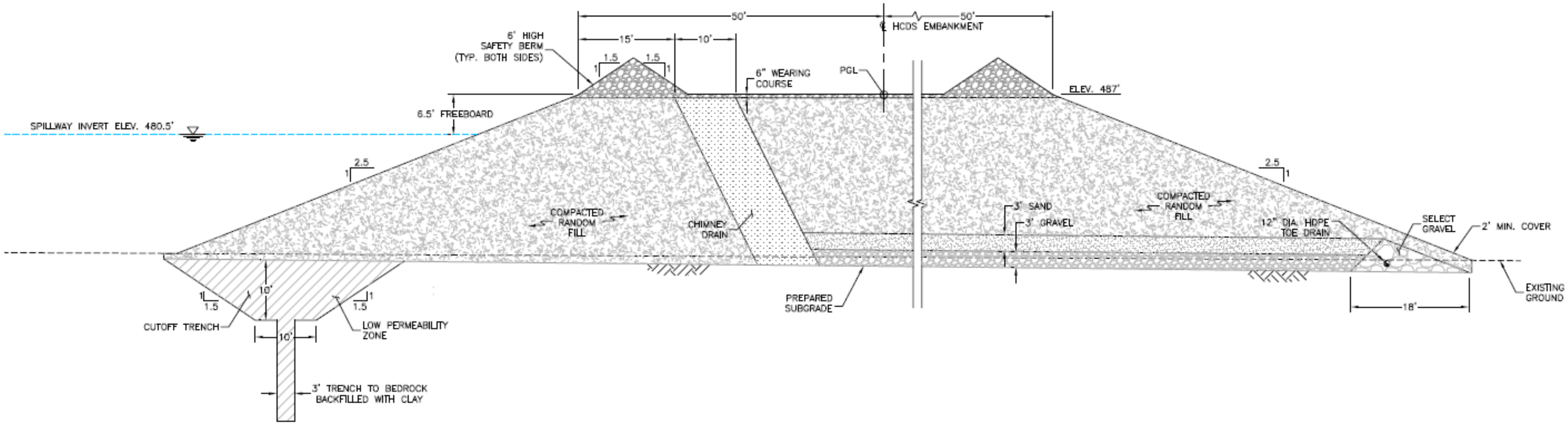


Figure 13. Cross Section of a Typical Detention Structure

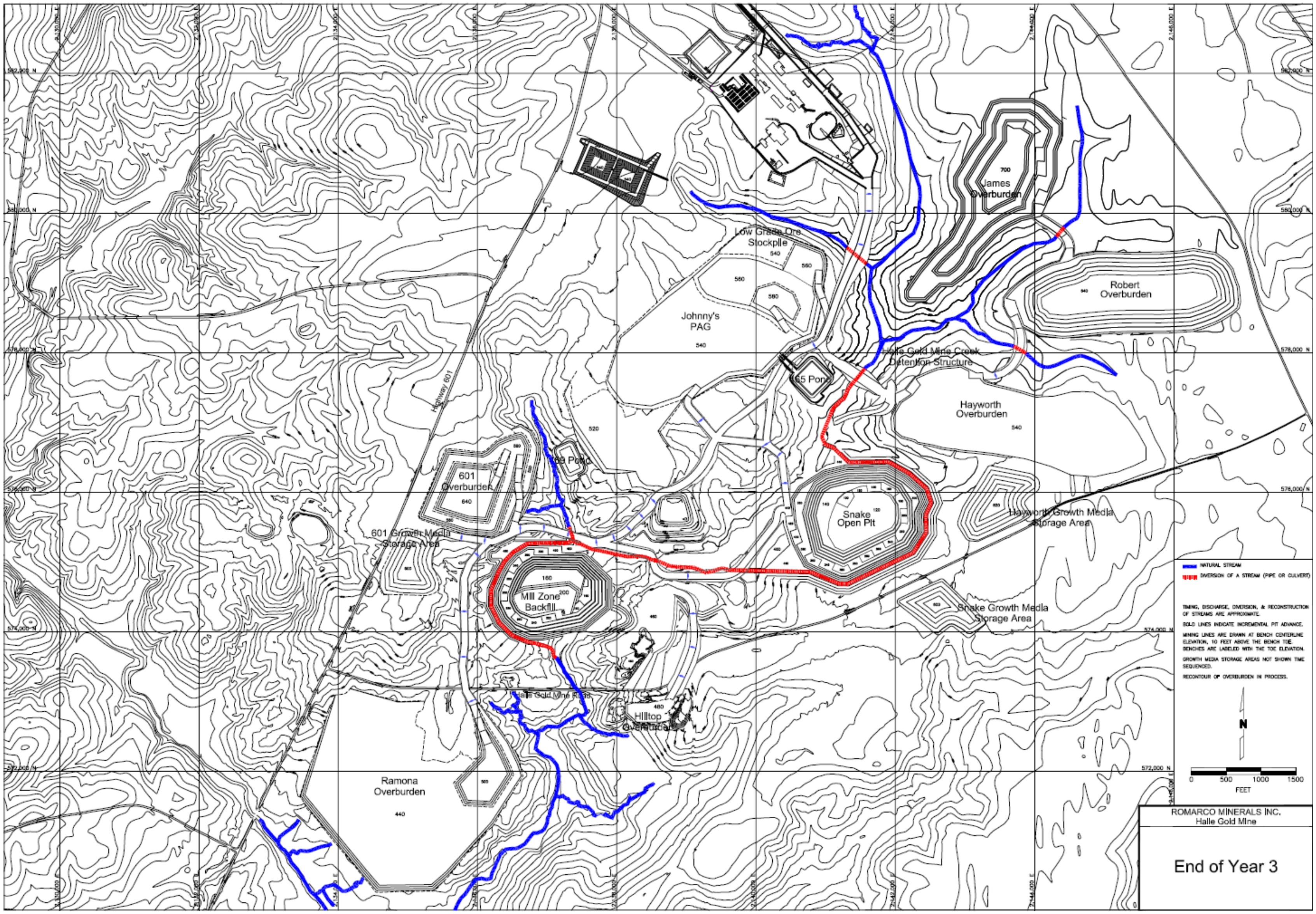


Figure 14. Location of the Diversion Modifications in Place by the End of Year 3

In Year 4, Haile will place the final alignment of pipe from the Haile Gold Mine Creek Diversion and Detention Structure, see Section 2.11.7, which will run along the southern and eastern sides of the active mining areas. The mining in the Red Hill and Haile Pits will progress to an elevation that will enable the construction of the southern diversion bench, so that the Haile Gold Mine Creek diversion pipes will run from approximately 435 feet AMSL on the east end to release at approximately 400 feet AMSL at the natural stream grade. The diversion pipes will be relocated from the route on the south side of the former Ledbetter Reservoir and west side of the Mill Zone Pit to the new Red Hill and Haile Pit diversion bench. The Haile Gold Mine Creek North Fork diversion pipes will remain on the west side of the Mill Zone Pit. *See* Figure 15, below.

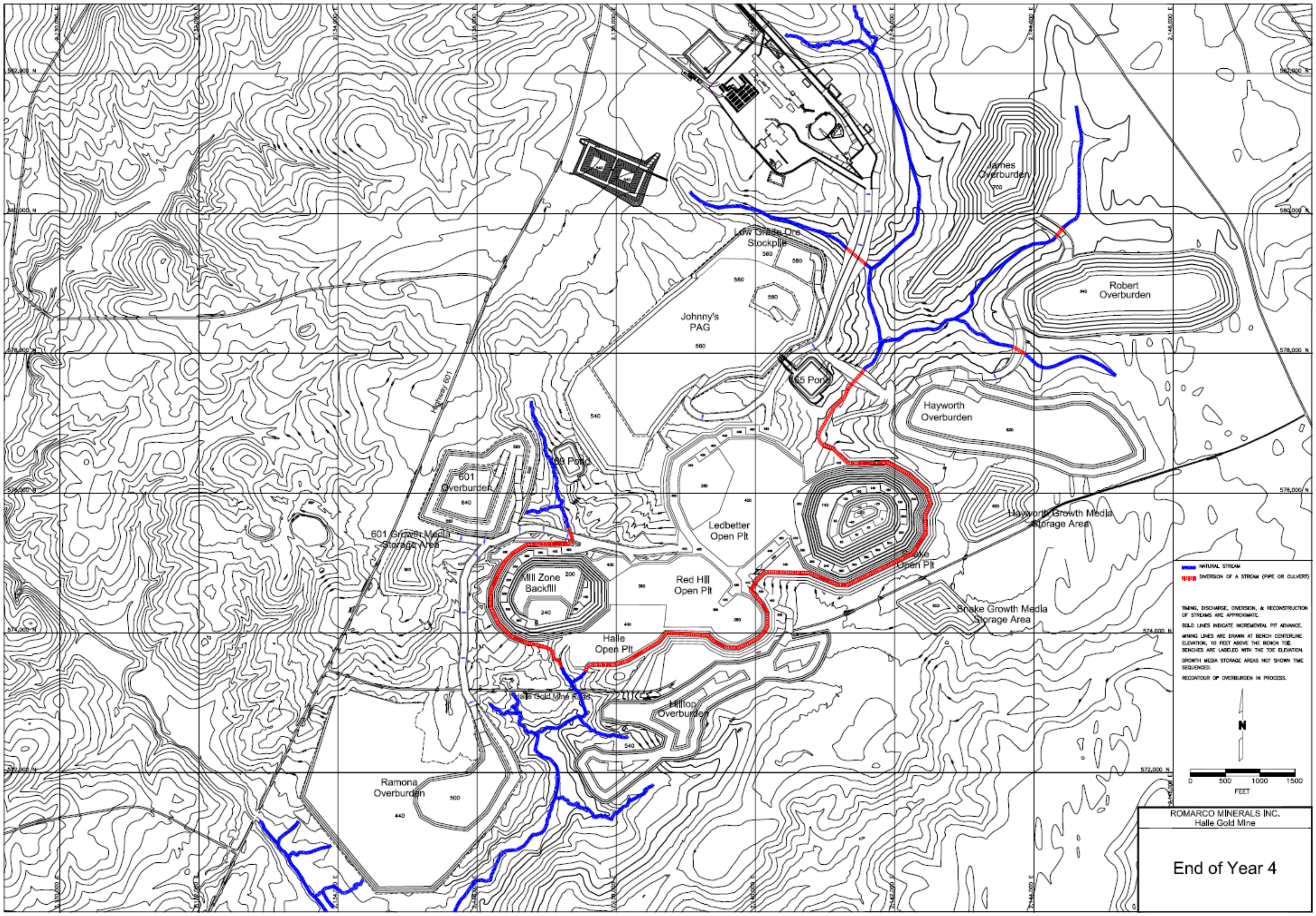


Figure 15. Location of the Pipe Alignment in Place by the End of Year 4

Concurrent Reclamation Activities

As the pits in the South Pit complex are backfilled and reclamation is completed, the North Fork Creek drainage will be re-established on the surface of the backfill. However, restoring of the flow in the re-established stream will not be done immediately. The North Fork diversion pipe is expected to be relocated from the Mill Zone diversion bench on the west side of the pit adjacent to the newly re-established stream gradient. The re-established portion of the North Fork Creek will tie into the undisturbed portion of the North Fork Creek on the downgradient edge of the backfilled South Pit. Haile expects that the North Fork stream flow will be maintained in the relocated diversion pipe for several years before removing the pipe and returning flows to the re-established channel, after settling of backfilled locations and appropriate establishment and stabilization of a stream bed. Erosion controls, such as riprap or gabion structures will be installed to limit erosion of the main channel and vegetated overbanks The stream channel will be constructed to convey the flow from the 100-yr, 24-hr storm event. The re-established stream channel will be designed to function as a natural stream, with appropriate sinuosity and the potential for adjacent wetland establishment. *See* Figure 16, below.

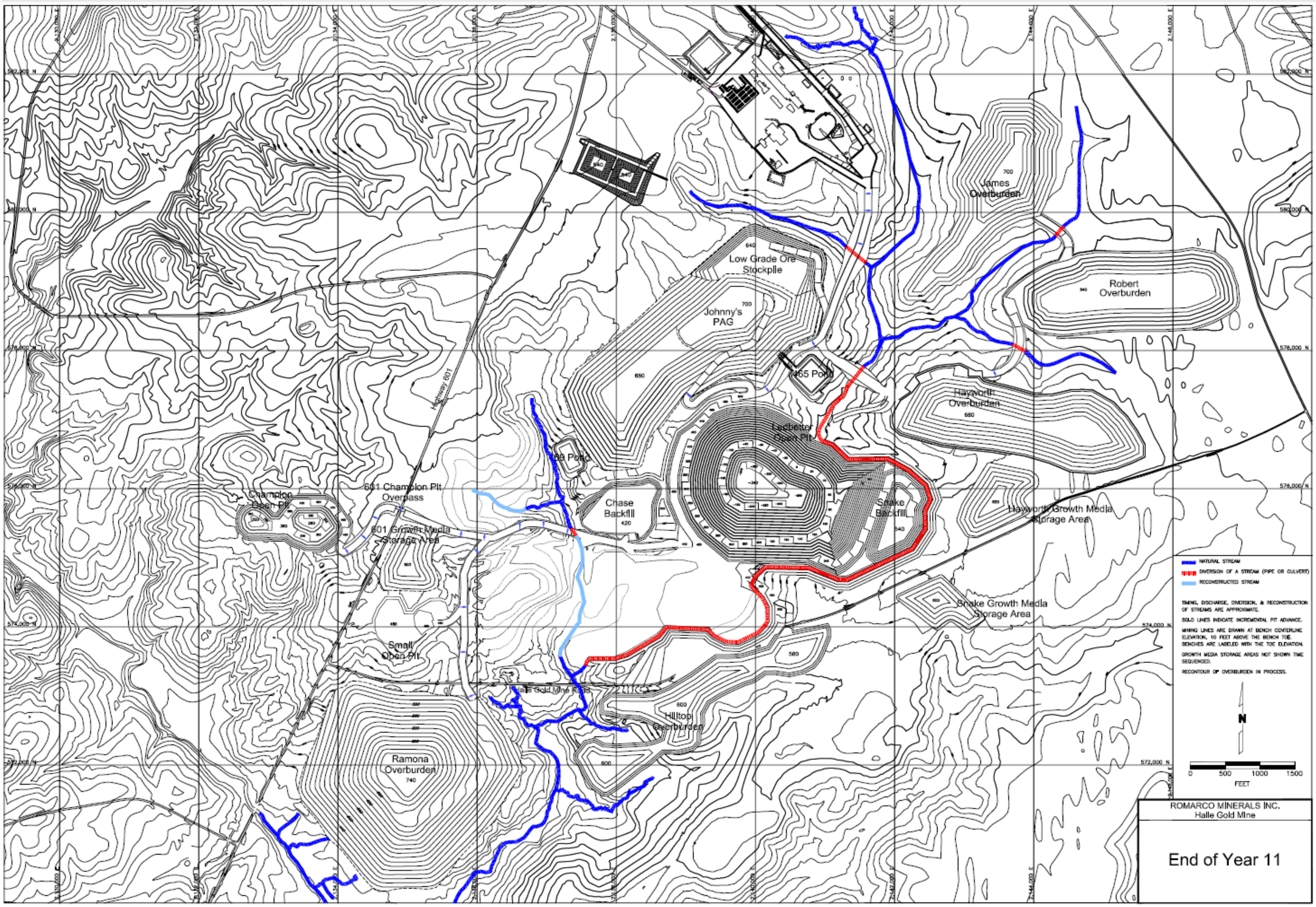


Figure 16. Location of the Re-Established North Fork in Place by the End of Year 11

A portion of Haile Gold Mine Creek flow (downstream of the Ledbetter Pit) that is in the diversion pipe on the Red Hill and Haile diversion bench will be relocated to flow in a reconstructed stream placed over the Red Hill and Haile Pits backfilled area. This reconstructed channel is planned to join a portion of the North Fork and then flow into Haile Gold Mine Creek. The Haile Gold Mine Creek Detention and Diversion Structure, *see* Section 2.11.7, and pipes will either be modified and remain in place above this reconstructed channel, or replaced with a low head dam. The Haile Gold Mine Creek flow from upstream of the Ledbetter Pit will be split between a diversion to allow some flow into Ledbetter Pit Lake and some flow through the diversion pipes to the reconstructed stream channel. Haile will divert flow into the Ledbetter Pit Lake only as may be authorized by the South Carolina DHEC, Bureau of Water, Surface Water Withdrawal Permitting Section standards consistent with State standards for “safe yield” from the creek. *See* Figure 17, below.

The reestablished stream channels (North Fork and HGMC) will be designed to function as natural streams, with appropriate sinuosity and the potential for adjacent wetland establishment. Wetlands impacted by construction of road crossings (culverts or bridges) will be reclaimed using the wetland seed mix.

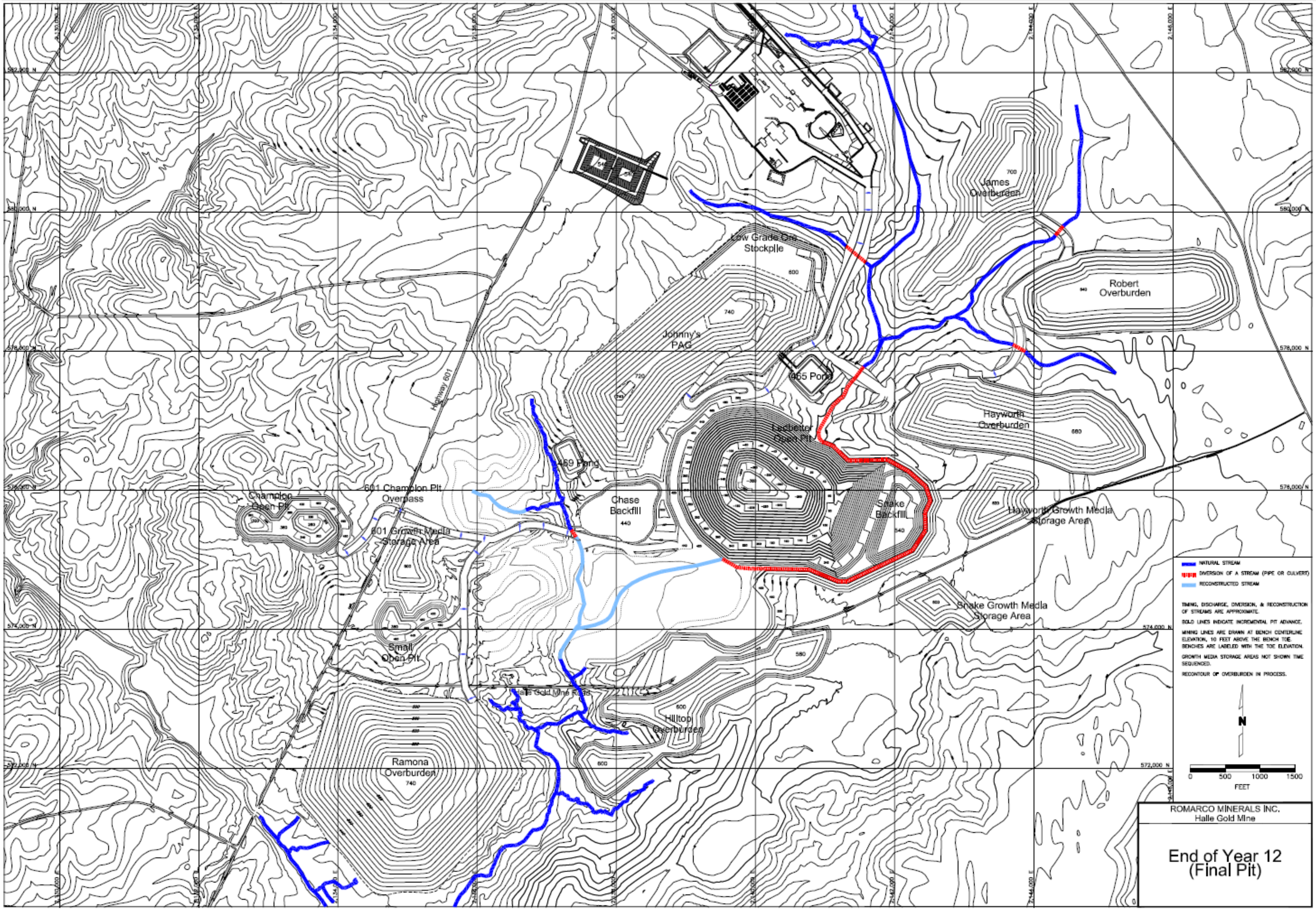


Figure 17. Location of the Reconstructed Channel in Place by the End of Year 12

Upon the filling of Ledbetter Pit Lake, the Haile Gold Mine Creek Detention and Diversion Structure / low head dam is expected to be channeled out and re-graded such that all streamflows in Haile Gold Mine Creek will flow into Ledbetter Pit Lake with flows exiting the pit lake through an engineered outlet structure into the re-established downstream channel. It is expected that filling of the Ledbetter Pit Lake will take approximately 20 years post mining and the engineered outlet structure will be designed prior to this time in cooperation with DHEC. The plan is to allow the upper Haile Gold Mine Creek to flow through the Ledbetter Pit Lake, out of Ledbetter Pit Lake through an engineered outlet structure, into re-established stream channels constructed over the backfilled pits, into the Lower Haile Gold Mine Creek, and into the Little Lynches River. The approximate location of the North Fork and Haile Gold Mine Creek re-established channels are shown on Figure 3.

2.7 Tailing Storage Facility

The TSF will be located approximately 1.5 miles north of the main mining area. The TSF will be constructed using conventional downstream construction methods to raise the embankment in four stages. The Site topography is such that to achieve the total storage capacity the embankment will be a four-sided ring dike configuration, approximately 5,500 feet by 3,500 feet along the embankment crest centerline for the longest embankment legs. *See* Figure 18, below.

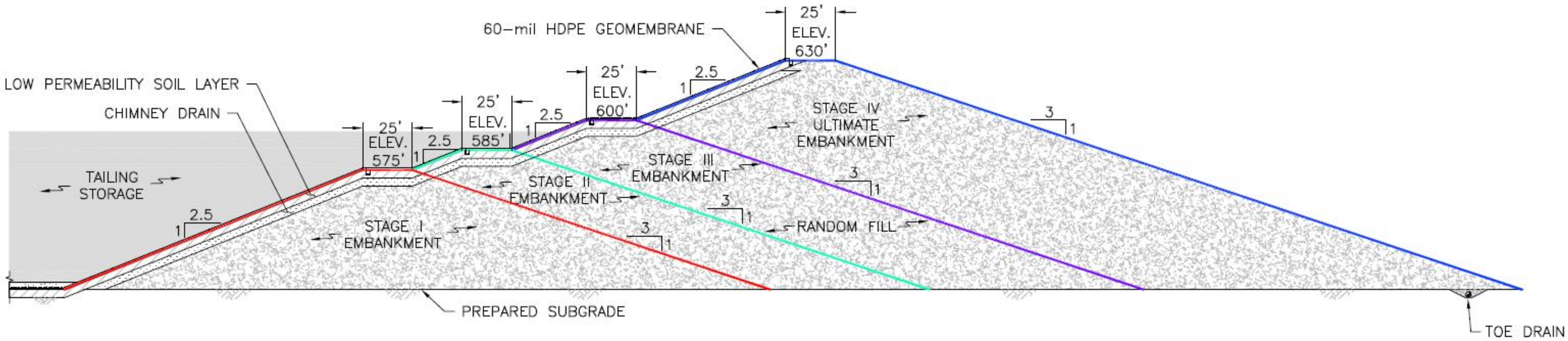


Figure 18. Cross Section of the Tailing Storage Facility Embankment Showing the Stages of Construction

The facility will be underlain by a composite liner consisting of a low permeable soil liner and a 60 mil HDPE liner. An underdrain system over the 60 mil HDPE liner system will collect seepage/consolidation water from the tailing and convey it by gravity to the Underdrain Collection Pond at the toe of the southwest embankment. Groundwater will be routed under the TSF in collection pipes installed below the HDPE and low-permeability soil liner to route groundwater from beneath the facility (to avoid contact with the tailing material). See Figure 19 for a cross section view of the TSF underdrain collection system, which feeds the TSF Underdrain Collection Pond, and groundwater piping.

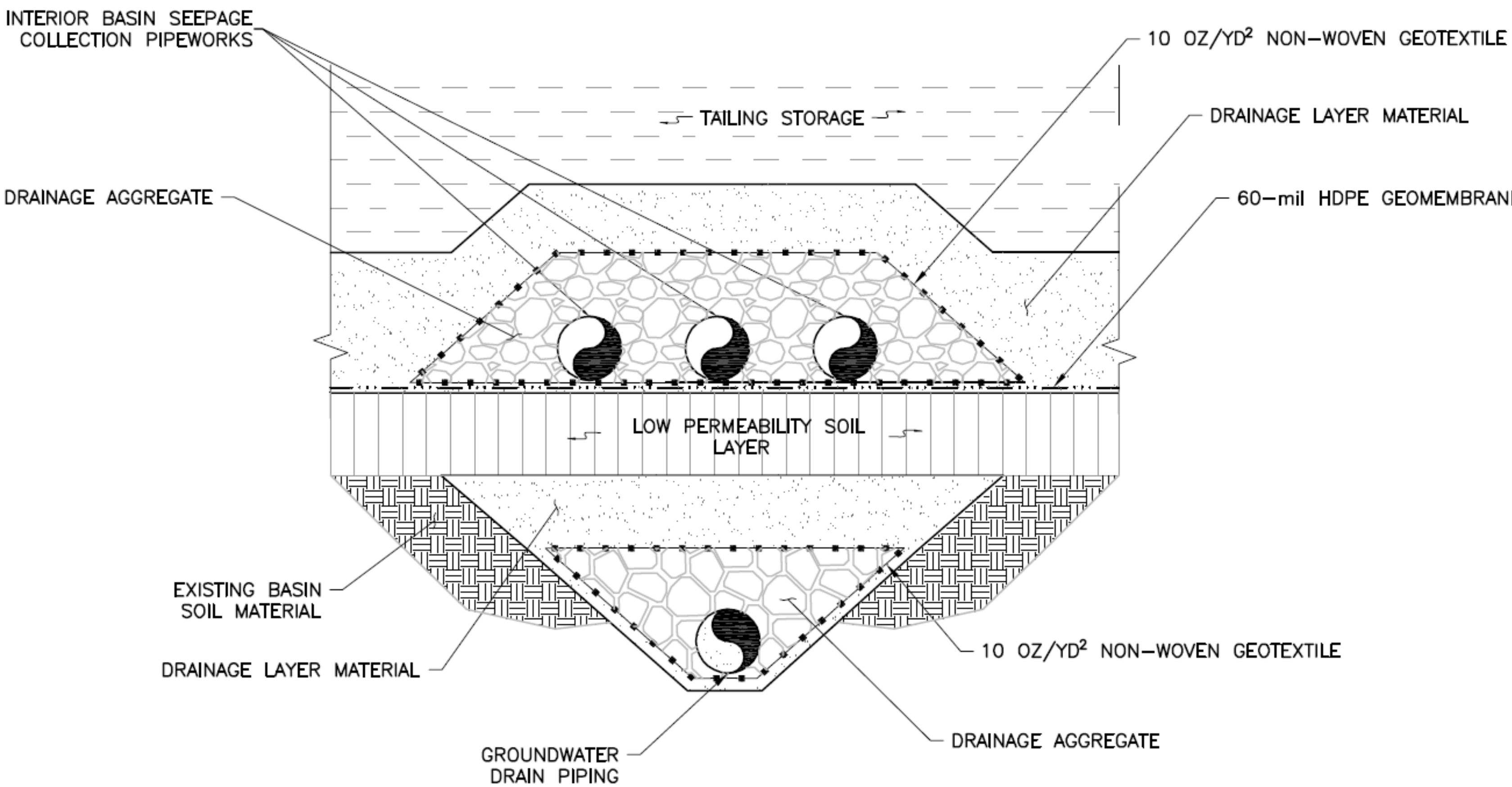


Figure 19. Cross Section of TSF Groundwater Drain and Seepage Collection System

A starter embankment will be constructed to elevation of 575 ft amsl using structural fill from local sources. As additional capacity is required in the embankment, additional structural fill from local designated borrow areas (601 OSA, Holly and Hock TSF Borrow Areas) will be used to raise the TSF embankment in a staged manner to an ultimate elevation of 630 ft amsl.

Tailing slurry from the Mill will be deposited in the TSF from a header and spigot system along the northern dam crest. Spigots will be rotated around the facility to develop sub-aerial deposition with a TSF Reclaim Pond near the southern corner of the impoundment during operation. Reclaim water in the TSF will be pumped from a floating barge to the Mill for re-use in ore processing. Water levels within the TSF will be maintained for adequate freeboard and storm surge at all times. As the TSF is located in the headwaters of Camp Branch Creek, limited diversions channels will be required to direct run-off around the embankment.

The TSF has an ultimate capacity of approximately 40 million tons at an ultimate embankment height of 150 feet. The facility will have a footprint of approximately 524 acres and the total centerline crest length of the embankment will be approximately 16,300 linear feet.

2.7.1 Dry Closure Plan

The dry closure plan of the TSF will focus on isolating the tailing material from exposure to the environment and limiting infiltration of water into the tailing. The reclamation approach consists of the follow general steps, described more fully below.

- Concurrent reclamation of the outboard slopes of the TSF embankment immediately after the establishment of the final embankment downstream raise. In the interim, the outboard slopes of each stage of construction will be seeded using a grass mixture to minimize soil loss and sediment loading to the storm water management system.
- At end of milling, treat and discharge the fluids from the remaining Reclaim Pond located within the TSF impoundment.
- As conditions within the TSF allow, develop a stable tailing surface with positive post-settlement drainage within the TSF Impoundment toward the TSF Reclaim Pond. Any activities within the TSF will maintain the operation constraints of freeboard and probable maximum precipitation (PMP)[2] storage in the impoundment.
- Construct a low permeability cover on the tailing surface. This low permeability cover will consist of an HDPE cover with a minimum of two feet of growth media over the liner. The cover will limit water infiltration into the tailing material and thus reduce long-term seepage to the underdrains. Following placement of the growth media cover, the surface would be revegetated with approved seed mix.
- Provide storm water controls within and off the reclaimed TSF impoundment.
- Treat and discharge post-depositional seepage from the TSF underdrains until the flow has decreased to the level where passive treatment of the seepage is feasible.

[2] A PMP event is defined by the American Meteorological Society as “the theoretically greatest depth of precipitation for a given duration that is physically possible over a particular drainage basin at a particular time of year” (AMS, 1959).

- After approval from DHEC, construct a passive treatment system to treat the TSF underdrain discharge.
- Future land use of the TSF will consist of limited recreation, with monitoring.

2.7.2 Detailed Reclamation Components

Concurrent Reclamation of the TSF Outboard Embankment Slope

After the initial starter embankment construction, the TSF embankment will be raised as needed to provide operational capacity within the TSF. The outboard slopes of the embankment will be constructed to a final 3H:1V grade. Raises will be performed in a downstream fashion, thus the outboard slopes of the embankment will not be available for concurrent reclamation until the completion of the final embankment raise, which is projected for completion in Year 7. Once the outboard slopes of the TSF achieve final configuration, the outboard slopes of TSF embankment will be vegetated with an approved seed mix and established seeding methods. *See* Section 2.1.1., Vegetation Plan.

Reduction of the TSF Reclaim Pond Volume

During operations, the volume of the Reclaim Pond within the TSF will fluctuate in response to climatic and operating conditions. Based on water balance modeling (ERC, 2010) and the anticipated final geometry of the tailing surface, the volume of the pool remaining at closure is expected to be approximately 200 million gallons.

The TSF Reclaim Pond will be brought to an absolute minimum value at the end of operations and the remaining water will be removed during closure by natural evaporation from the open water surface, enhanced evaporation from reclaim water recirculated to the exposed beach, and/or other DHEC approved evaporation methods. However, water balance modeling indicates that the Reclaim Pond volume remaining after closure will likely require an active treatment process.

The mine facilities include a Contact Water Treatment Plant (CWTP) to treat and discharge contact water anticipated at the mine Site during operations. Following reclamation activities, the majority of contact water flows will decrease significantly resulting in the CWTP being under-utilized. Haile will use the CWTP to treat and discharge the water stored in the TSF, generated from TSF seepage. Such treatment will occur separately from the ongoing treatment of seepage from Johnny's PAG, which will also occur at the CWTP.

Establishment of Positive Drainage in the TSF

One of the objectives of the dry closure is to prevent ponding of storm water runoff on the tailing surface to limit infiltration into the tailing. The geometry of the tailing surface towards the end of mining is expected to consist of mild sloping beaches (approximately 1% grade) towards a pool adjacent to the southeast embankment.

Following completion of tailing deposition, the tailing will continue to consolidate to some final average density. Based on the thickness of tailing, tailing disposal patterns and control of the location of the pool during operations, the tailing are expected to consolidate differentially over the impoundment area and form a bowl-shaped configuration. The deepest part of the 'bowl' will be in the area of the Reclaim Pond (water pool).

The tailing consolidation under the Reclaim Pond is anticipated to have very low strength. Some random fill is anticipated to be placed over the tailing using low ground pressure equipment to provide a suitable foundation necessary to perform grading and place an HDPE liner on the tailing surface. The Reclaim Pond will also be moved away from the embankment through placement (spigoting) of the tailing material prior to the end of milling. The reclamation approach has assumed approximately 377,680 CY of material will be used to fill the reclaim pond area to provide a stable surface. This material will come from growth media stockpiles or green OSAs.

To provide positive drainage from the tailing facility and to facilitate reclamation of the TSF, a channel will be excavated through the tailing from the invert of the bowl to the southern edge of the embankment, although the embankment will not be breached at that time. The channel will be graded to account for consolidation of the tailing so that the final reclaimed surface of the tailing will not pond water post-closure. The surface of the channel will be covered with random fill to provide a stable surface and graded to provide a suitably smooth surface for the HDPE liner.

Construct Geomembrane Cover on the TSF

As consolidation in an area of the tailing nears completion, that portion of the tailing will be covered with a smooth HDPE geomembrane laid directly on the tailing surface or foundation layer. The geomembrane will limit infiltration and will reduce long term seepage to the TSF underdrains, allowing the eventual use of passive treatment technology. The geomembrane cover will extend over the entire tailing surface to the edge of the TSF impoundment and will be sealed directly to the exposed TSF geomembrane liner at the perimeter of the TSF as shown in Detail 1 of Figure 20. Since the tailing material is fine and contains no foreign materials to potentially puncture the liner, there is no need for a protective clay layer below the liner installation. The tailing will be completely encapsulated within a geomembrane envelope.

Placement of the geomembrane liner will be staged from the northern (upstream) end of the TSF towards the low, southern corner. Placement of the geomembrane cover over the entire TSF surface has been assumed to take place over five annual stages. Each of these stages will occur in a different year, but not necessarily consecutively (as this will be dependent on a number of factors including drain down rate and beach stability). Approximately 17,249,760 sq ft. of geomembrane will be required to cover the TSF.

Following placement of the geomembrane cover, a minimum 2-foot thick layer of growth media will be placed over the geomembrane to protect it from damage, UV radiation, and freezing and to provide a soil layer for establishing vegetation. Material from stockpiled growth media will be placed on the geomembrane using low ground pressure equipment to minimize damage to the geomembrane. The growth media will be placed over any exposed geomembrane liner on the interior TSF embankment and the top of the TSF embankment, extending to the outboard slopes of the TSF embankment. The surface the embankment will be graded to allow precipitation on this surface to drain to the outside of the TSF embankment as shown on Detail 1 of Figure 20. The final surface will be vegetated with an approved seed mix and established seeding methods. *See* Section 2.1.1, Vegetation Plan.

Approximately 1,277,760 CY of growth media will be required to cover the tailing surface and approximately 524 acres of reclaimed tailing and embankment will require revegetation. Typical details of the TSF closure cover are shown in the Detail 5 of Figure 20.

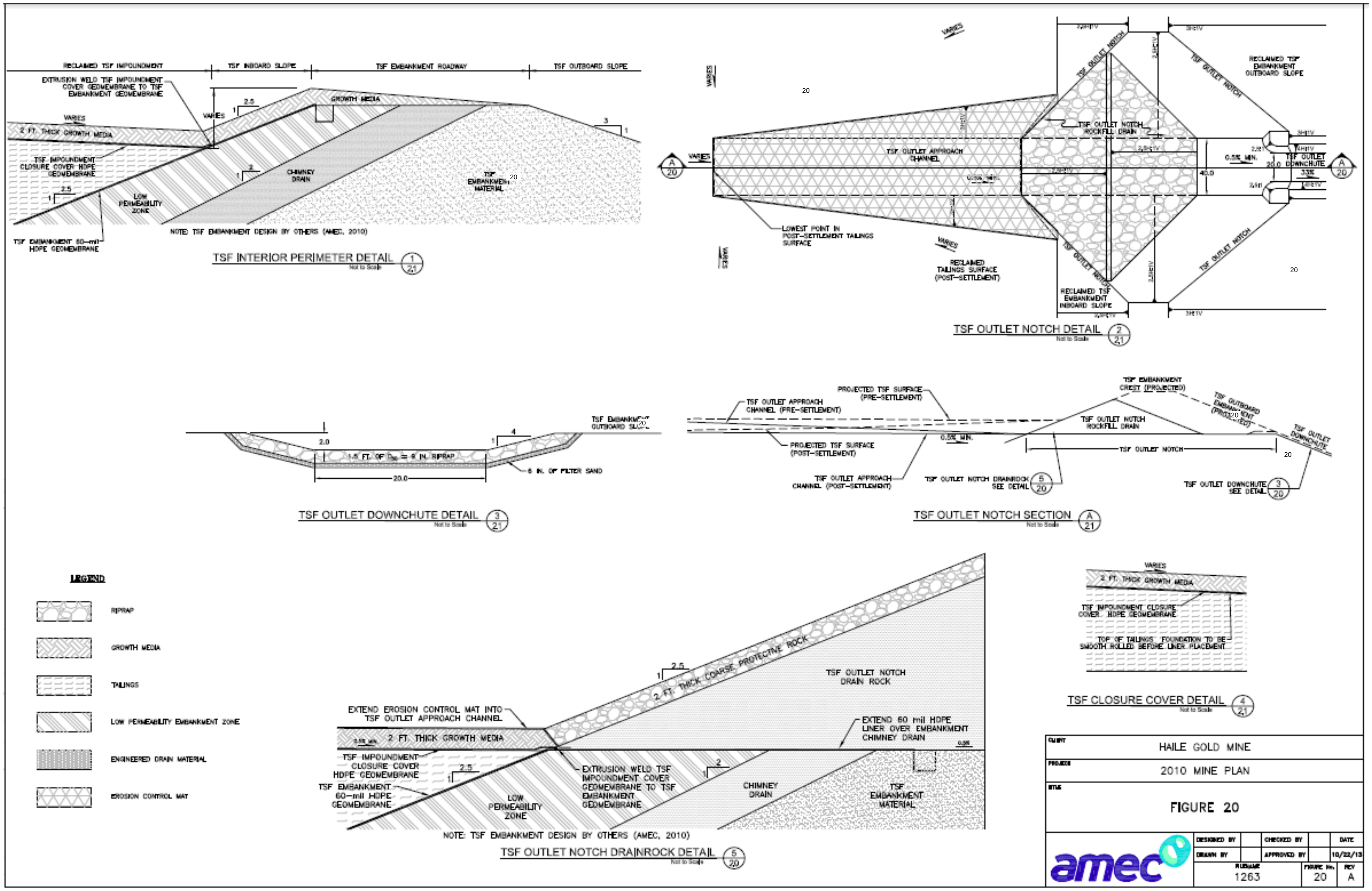


Figure 20. Tailing Storage Facility Pre-Consolidation Surface and Outlet Notch

Provide Stormwater Controls for the TSF

The final geometry of the TSF closure cover has been configured to provide drainage off the cover material. The configuration will force water toward the center of the tailing to a constructed swale or shallow channel on the tailing cover. The anticipated ultimate surface inside the TSF embankment will concentrate precipitation near the center and then grade gently towards the south perimeter. To control the erosion of the final cover, the shallow surface water swale will be constructed down the center of the TSF as shown in Figure 21, with erosion controls if necessary, leading to the post-closure tailing channel described below.

Once the closure cover is in place over the TSF and the tailing has been isolated from the environment, an outlet will be constructed through the embankment such that the bottom of the outlet is at the same elevation as the excavated channel constructed through the tailing as described above. *See* Figure 21. This will allow all surface water flows to discharge from the surface of the TSF without permanent ponding over the tailing surface or contacting the tailing solids.

All storm water run-off generated in the TSF will discharge down the outboard face of the 3H:1V embankment. To prevent erosive high velocity flows on the embankment, the outlet notch will be filled with a rock drain constructed with durable, inert rock. Flow control will be provided by a central section with zones of increasing particle sizes upstream and downstream. The outermost zone will be large diameter boulder and cobbles within sufficient inlet capacity to prevent plugging from debris during periods of high water.

The rock drain will have the capacity to drain runoff from the PMP within a relatively short time (i.e., 2 to 3 weeks) while allowing runoff from average annual peak precipitation to drain without creating significant ponding over the closure cover. A notch approximately 40 feet wide and 28 feet deep, filled with coarse sand and gravel to within 6 ft of the embankment crest, will be engineered to meet this hydraulic criteria. The final design of the channel and gravel drain will be optimized in final design of the TSF closure system.

A channel will be constructed to convey the flow from the notch to existing drainages adjacent to the toe of the TSF embankment. As the rockfill outlet drain will reduce the PMP flow rate to this channel to less than 100 cfs, a smaller channel would be required (approximately 20 feet bottom width with 15 inch thick riprap for erosion protection). The outlet notch will be armored to limit erosion of the closure cover. An energy dissipater and conveyance channel will convey the flow to Camp Branch Creek.

Typical details of the surface water controls are shown in Details 3, 4 and 5 of Figure 20.

The general configuration of the TSF surface is shown in Figure 21. The final reclaimed surface elevation of the TSF cover will be such that precipitation from the PMP onto the TSF will be safely discharged through the TSF embankment notch and constructed channel down the embankment face and into the natural drainage.

Treatment of Collected Underdrain Seepage

Water seepage through the tailing will be intercepted by the operational underdrains in the TSF and collected in the Underdrain Collection Pond. The water in the Underdrain Collection

Pond will be treated and discharged using the existing reconfigured Haile Gold Mine Contact Water Treatment Plant. As the geomembrane cover is installed and the tailing approach ultimate density, the infiltration/seepage rates are expected to ultimately decrease to less than 15 gpm. Draindown would continue to be collected in the TSF Underdrain Collection Pond and treated as provided for under the modified NPDES permit until the seepage is determined to be at the point where a passive treatment cell can treat the volume of flow from the seepage collection system. As described for Johnny's PAG, see Section 2.5.1, the passive treatment cell will improve the water chemistry of the seepage to acceptable levels for state permitting requirements. As with all passive treatment system, the nature of the organic strata must be specifically tailored to the effluent stream, and permitted by SCDHEC.

The proposed TSF passive treatment cell is shown in Figure 21.

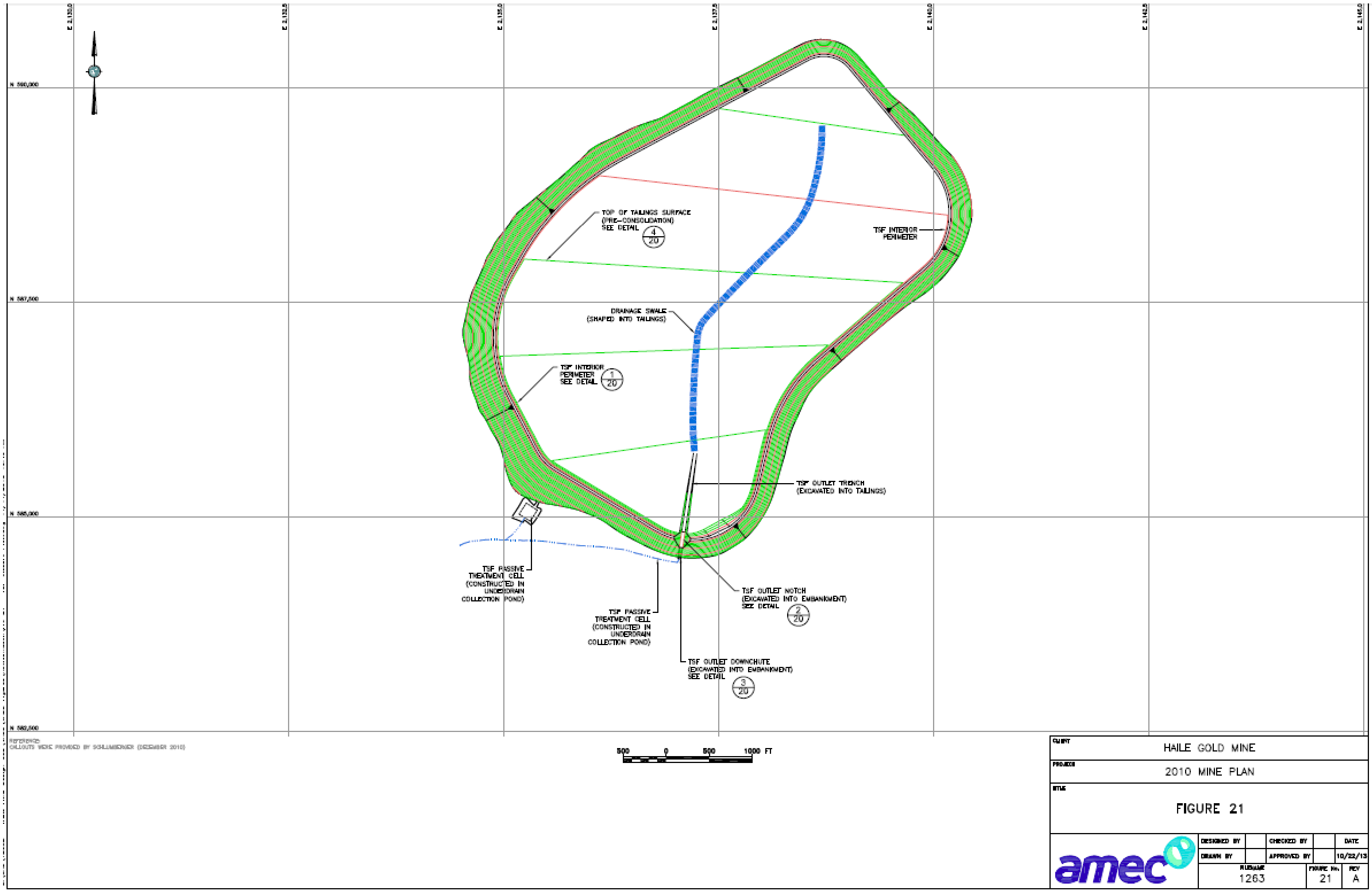


Figure 21. Tailing Storage Facility Closure Details

2.8 Borrow Areas

Two borrow areas (Holly and Hock) will be developed to provide sufficient material for construction and expansion of the TSF. Borrow material from the Holly TSF Borrow Area will be used for the second stage of construction in Year 2 and from the Hock TSF Borrow Area for the third stage of construction scheduled for Year 4. Once material from the borrow areas have been exhausted the areas will be reclaimed. Haile anticipates that the Holly TSF Borrow Area will be reclaimed following completion of the second stage of the TSF expansion and the Hock TSF Borrow Area will be reclaimed after the third stage of the TSF expansion.

During removal of material for construction from both borrow areas, slopes on the edges of the borrow areas will be maintained at a 3H:1V or shallower. Since material is being removed to lower the elevation without creating pits, slope grading should be minimal during reclamation. Also during operations, slopes retained within the borrow areas will allow precipitation to flow off the areas and not create pooling. Reclamation of the borrow areas will include scarifying to loosen compacted soils and revegetating with an approved seed mix using approved seeding techniques. *See* Section 2.1.1, Vegetation Plan.

2.9 Prior Mining Facilities

The prior mining facilities described in this section will be moved and reclaimed during operations, since the Mine Plan includes the locations of these prior mining facilities. Reclamation at these locations has been ongoing, and is covered under existing reclamation plans and financial assurance. Haile expects to work with DHEC on addressing the changes, if any, to current reclamation plans that may be needed to be consistent with the Mine Plan and Mine Permit. For prior mine facilities presenting a risk to the environment, the Mine Plan and this Reclamation Plan are designed to use the lined facilities in place for mining to handle such materials. Sediments underlying the Chase Hill and South Leach Pads, where dilute cyanide solutions were used to recover precious minerals, will be analyzed for concentrations of Weak Acid Dissolvable (WAD) cyanide in advance of mining activities at these locations. Sediments with WAD cyanide concentrations in excess of 0.2 mg/l will be removed and placed on a lined facility, either Johnny's PAG or the TSF.

Sampling of the soils beneath the liner of the Chase Hill and South Leach Pads will initially be conducted on a 200 foot-by-200 foot grid. A visual observation of the soil looking for evidence of soil staining/discoloration attributed to iron (acid drainage) or a concentration of salt (sodium) will be performed to help focus the sampling efforts within the grid. If there is no evidence of soil staining, the sampling will be performed randomly within the grid. Soil samples will be taken at the surface and analyzed for total sulfur and WAD cyanide. If the sample results, within the 200 foot-by-200 foot grid, exhibit a concentration above 0.2% sulfur or a concentration above 0.2 mg/l WAD cyanide, then the sampling grid will be reduced to 100 foot-by-100 foot and additional samples will be obtained within the grid that exhibits elevated concentration and possibly within an adjacent grid depending on the proximity of the sample to the adjacent grid.

At this time, the soil will be analyzed for only the elevated constituent and two soil samples will be obtained, one from the surface and one at a depth of two feet. Should these analytical results show elevated levels of the constituent of concern, the material would be removed down to a minimum of two feet and the area resampled. The resampling results – i.e., whether the results exhibit a concentration above 0.2% sulfur or a concentration above 0.2 mg/l WAD cyanide – will dictate if additional soils need to be removed (and managed accordingly) and the area resampled.

During reclamation in areas where cyanide solution, chemicals, petroleum, and other products which have the potential to affect planned reclamation efforts were stored, handled, or used, soils beneath and adjacent to these areas will be sampled and analyzed to ensure they are acceptable for reuse during reclamation. If they are not – i.e., results exhibit a concentration above 0.2% sulfur and or a concentration above 0.2 mg/l WAD cyanide – the soils will be removed and placed on one of the lined facilities or disposed of off-site in an approved facility.

2.9.1 Chase Hill Leach Pad

The material on the Chase Hill Leach Pad will be removed and placed in Johnny's PAG for permanent storage. This operational activity will include removal of the entire cover and liner system of the Chase Hill Leach Pad and placing all of this material in Johnny's PAG. Removal of this leach facility would leave approximately 16.6 acres of bare soil beneath the leach pad exposed. Haile will implement a soil sampling program, as described above.

2.9.2 South Leach Pad

During the initial mining of the Ledbetter Pit and Chase Pit, the material on the South Leach Pad will be removed and placed in Johnny's PAG for permanent storage. This operational activity will include removal of the entire South Leach Pad cover and liner system, leaving approximately 10.1 acres of bare soil beneath the leach pad exposed. Haile will implement a soil sampling program, as described above.

2.9.3 Hilltop 1 Pit

Hilltop I Pit is located south of Haile Pit. This former sericite pit is part of the current reclamation program (and financial assurance) and the location is anticipated to be affected by planned Haile Gold Mine operation. Haile will backfill this pit with green overburden from mining of Haile Pit, scarifying to loosen compacted soils, and revegetating with an approved seed mix using approved seeding techniques. *See* Section 2.1.1, Vegetation Plan.

2.10 Mill Site and Associated Infrastructure

As facility components of the Mill Site are no longer needed and decommissioned, remaining materials, equipment, and buildings will be removed. Non-hazardous and nontoxic solid waste such as lumber and non-salvageable metal scrap will be removed from the Site and either recycled or disposed of at an appropriate facility. Hazardous and toxic materials such as reagents, petroleum products, acids, and solvents will be removed from site by licensed transporters and either returned to the vendor, sold or disposed of at approved facilities.

Equipment and piping not needed for the reclamation and monitoring process will be rinsed, as necessary, prior to being sold, salvaged or disposed in an approved manner.

No buildings are currently planned to remain at the Haile Gold Mine Site when the Mill ceases production. As the various Site components cease operation, associated buildings will be emptied, dismantled, and removed from the Site.

The administration building, Contact Water Treatment Plant (CWTP) and gate house buildings will remain until final closure and reclamation activities are completed at the TSF. Mine and Mill Site facilities are likely to be the earliest facilities to be salvaged and removed during reclamation and closure. Final reclamation will result in the removal of all permanent buildings from the mine Site, with only an office trailer remaining for use by long term care and maintenance staff as shown on Figure 3. Ultimately, this trailer will be removed when no longer needed.

All buildings proposed for the Haile Gold Mine Site will be constructed with metal framing, and the net salvage value of the buildings is anticipated to be positive. However, for the reclamation cost estimate, no salvage value for building materials has been assumed.

Approximately 8,400 CY of concrete foundations are proposed for the Haile Gold Mine Site (M3, 2010). These will include building slabs, Mill and CWTP foundations, and sidewalks and parking areas. The Reclamation Plan assumes that one third of the concrete will be broken in place and buried as part of the Site regrading effort. The remaining two thirds of the concrete at the Site will remain in place and will be buried during regrading of the Site.

Reclamation of building and equipment sites will be completed by grading the sites for positive drainage and covered with a minimum of two feet of growth media. The final surface will be vegetated with an approved seed mix and established seeding methods.

Approximately 4,195 CY of growth media will be required to cover the building and equipment sites and 103 acres will require vegetation.

2.11 Roads, Power lines and Miscellaneous Facilities

2.11.1 Roads

Operations at the Haile Gold Mine will require roads and traffic areas to be constructed for operations. With the exception of some paved areas near the entrance facility, Snowy Owl Road and portions of State Road 188, all mine roads are anticipated to be dirt or gravel. Approximately 186 acres of road disturbance, including haul and service (access) roads, would be reclaimed. Some roads would remain open during post-mining monitoring. The total road disturbance includes all haul roads and light vehicle roads that are constructed during operation.

During closure, the majority of the roads and parking areas will be reclaimed, as will all unused light duty service roads around the mine Site. All haul roads will be reclaimed, although a narrow width of some of the haul roads will remain for access to facilities during post-closure.

For the purpose of this Reclamation Plan, it is assumed that an area equal to the identified road and parking areas will be reclaimed. It is understood that some mine Site service roads will remain open for post closure use, as well as some of the operational facility access roads. The extents of the proposed mine haul roads and proposed post-closure access roads are shown on Figures 3 and 4.

Reclamation will consist of scarifying to loosen the soils and break up the gravel road surface, followed by pushing the berm material over the road surface and regrading to promote positive drainage. The final surface will be vegetated with an approved seed mix and established seeding methods. *See* Section 2.1.1, Vegetation Plan.

2.11.2 Ponds and Surface Water Controls

Various ponds and other surface water controls at the Site will be reclaimed at closure once they are no longer needed. The majority of these structures will be sediment control structures located downstream of the various OSAs and haul roads. These facilities will be reclaimed and vegetated as the need for the sediment controls is eliminated by the reclamation of the facilities. Unneeded sediment control structures will be regraded to promote positive drainage and vegetated with an approved seed mix and established seeding methods. *See* Section 2.1.1, Vegetation Plan.

Other facilities that will be reclaimed may include surface water controls that may be armored to limit erosion. Erosion control features that will not be required for post-closure will be broken up and buried in place as part of the regrading effort to promote positive drainage. Unneeded surface water features will be regraded to promote positive drainage and vegetated with an approved seed mix and established seeding methods.

The 465 and 496 Collection Ponds, 19 Pond, Process Event Pond, Utility Pond, and TSF Underdrain Collection Pond at the Site will be lined with geomembrane liners to limit seepage and to protect the environment. As the 19 Pond and Process Event Pond are decommissioned, any water in the pond will be removed and disposed of through treatment or transferred to the TSF. The locations of 465 and 469 Collection Ponds and the TSF Underdrain Collection Pond will be used for passive treatment cells for Johnny’s PAG and the TSF, respectively. *See* Sections 2.5.1 and 2.7.2 for further details. Sediments remaining in the ponds will be analyzed to determine the suitability for disposal. Depending on the results of the analysis, sediments in the 19 Pond and/or Process Event Pond may be buried in place, removed and placed in the lined TSF with processed tailing, or removed and placed in the lined Johnny’s PAG.

Once the pond sediments have been addressed, the pond liner will be cut to eliminate the ability to impound water and the liners folded into the pond. The ponds will be regraded to promote positive drainage and vegetated with an approved seed mix and established seeding methods. *See* Section 2.1.1, Vegetation Plan.

2.11.3 Electrical Power Facilities

Approximately 22,176 feet of power line is anticipated at the mine Site. All transformers proposed for the Site are expected to be pad mounted and will be readily available for salvage or reuse elsewhere. Throughout reclamation, electrical power will be required in ever decreasing amounts. As final closure is completed, the only power anticipated for the mine Site will be utility power to the portable trailer needed for long-term care and maintenance personnel.

Haile anticipates that Duke Energy will supply the power to the mine and Lynches River Rural Electric Cooperative (Lynches River), along with their engineering and construction partner, Central Electric Power Cooperative (Central Electric). They would construct a new 69 kV overhead power line (main line) to and within the Project Site and a 69 kV / 24.9 kV substation located at the Mill Site to serve the mine. Central Electric has an existing 69 kV power line known as the Heath Springs to Flat Bush transmission line that runs in an east - west direction north of the proposed Haile Gold Mine Site. A new connecting 69 kV line of approximately 4.5 miles would be constructed to run from near the intersection of this line and Duckwood Road north of US Highway 903 to a substation on the Haile Gold Mine property. Most of the new line at the Mill Site will run within or alongside of the existing Duckwood Road and US Highway 601 utility right-of-way.

For the purposes of reclamation costs, the approximately 22,176 feet of ancillary overhead power lines on Site will be removed at closure and reused or disposed in an approved facility, although a small portion of the low voltage power line will, in fact, remain as described above. As the main line is not Haile's power line, it will not be something that Haile can remove.

2.11.4 Pipelines

Approximately 71,200 feet of pipeline including the tailing pipeline corridor is anticipated at the mine Site. Additional pipelines will be constructed as needed to convey flows around the Site for pit depressurization, contact water treatment, and dust control supply. When mining activities cease, pit depressurization flows will cease, but water treatment for Johnny's PAG and the TSF seepage will continue to be required until passive treatment cells can be developed for these facilities; water treatment for contact water will also be required until the source areas are reclaimed. Throughout reclamation and closure, pipelines will be required in ever decreasing amounts. As final closure is completed, the only pipelines anticipated to remain will be used to collect and convey flows to the passive treatment facilities.

For the purposes of reclamation costs, it is assumed that all of tailing pipelines will be removed and disposed in an approved facility, although a small amount of piping will, in fact, remain as described above.

2.11.5 Growth Media Storage Areas

During development of the mine, growth media storage areas will be developed to store growth media for use during reclamation. These facilities will be graded and vegetated as part of ongoing mine sediment control practices. As certain facilities around the mine are reclaimed, growth media will be removed from various storage areas around the Site and placed on the facilities (e.g., TSF and Johnny's PAG) to support vegetation; other facilities are not anticipated to require growth media to support vegetation, but this will be confirmed by test plots during initial years of mine operations. However, placement of six inches of growth media over the facilities where growth media is not anticipated has been included in the bond estimate. If not all of the stored growth media is consumed during the reclamation activities, the remainder will remain in the same configuration as developed. If necessary, remaining growth media storage areas will be graded and seeded. *See* Section 2.1.1, Vegetation Plan.

The growth media storage area locations will be concurrently reclaimed as these areas are exhausted. Reclamation of these exhausted storage areas will include regrading to promote positive drainage and revegetating with an approved seed mix and established seeding methods.

2.11.6 Low Grade Ore Stockpile

Low grade ore mined during operations and not processed will be placed on the low grade ore stockpile, located in the northern portion of Johnny's PAG. The low grade stockpile will be placed atop two feet of sand, overlain on the HDPE-liner and low permeability soil foundation and seepage collection system that comprise Johnny's PAG. Based on the current mining and processing schedule, this stockpile will be removed and processed in Years 13 and 14, leaving the liner and drainage system intact. In the event that this material is not processed, the ore will be left on Johnny's PAG and reclaimed in the same manner as the overburden on Johnny's PAG.

This area of Johnny's PAG will be the last area to be reclaimed and covered with geomembrane, and is estimated to be completed during Year 15. During reclamation, the portion of Johnny's PAG that contained the low grade ore stockpile will be regraded to promote positive drainage. A minimum of one foot protective layer of saprolite from local borrow sources will be placed over the regraded overburden to provide a suitable foundation for the geomembrane cover. The area of the low grade stockpile will be reclaimed as part of Johnny's PAG, described above in Section 2.5.1.

2.11.7 Haile Gold Mine Creek Detention and Diversion Structure

The Haile Gold Mine Creek Detention and Diversion Structure (Detention Structure) is expected to be constructed in Year 3. This Detention Structure will be placed in the upper reaches of Haile Gold Mine Creek at the same location and as part of the crossing of the new haul road between Johnny's PAG and Hayworth OSA. The Detention Structure will have the capacity to detain up to 70 percent of the 100-year precipitation event and will allow for controlled flow of HGMC into the diversion pipes around the mine pits. Stormwater exceeding the design event would flow through the Detention Structure emergency spillway into Ledbetter Pit. This water would become contact water and would be pumped to the HDPE-lined 19 Pond for use at the Mill as process water, or treated at the CWTP and released.

During reclamation, the Detention Structure and pipes will remain in place above the reconstructed lower Haile Gold Mine Creek channel. The Detention Structure will either be removed and replaced with a low head dam, or modified to function as a low head dam during post-mining. The intent of the low head dam is to maintain, at a minimum, regulated minimum in stream flows while allowing the remaining stream flows to flow into the Ledbetter Pit to expedite pit filling. Upon the filling of Ledbetter Pit Lake, the low head dam is expected to be removed and all streamflows will flow into Ledbetter Pit Lake with flows exiting the pit lake through an engineered outlet structure into the re-established downstream channel. It is expected that filling of the Ledbetter Pit Lake will take approximately 20 years post mining and the engineered outlet structure will be designed prior to this time in cooperation with DHEC.

The disturbed area of the Detention Structure will be regraded to promote positive drainage and vegetated with an approved seed mix and established seeding methods. *See* Section 2.1.1, Vegetation Plan.

3 POST-MINING MONITORING REQUIREMENTS

The Haile Gold Mine is primarily located in two drainages tributary to the Little Lynches River as shown in Figure 2. The majority of the mine facilities are located in the Haile Gold Mine Creek watershed. The TSF, TSF associated facilities, and Holly and Hock TSF Borrow Areas are located in the Camp Branch Creek watershed. Post-mining monitoring will be necessary to ensure the Site reclamation and closure features are performing as intended and the Site has been successfully reclaimed for sustainable post-mining land use.

3.1 Post-Mining Care and Maintenance

The reclamation designs for the facilities at the Haile Site were developed to reduce the need for long-term care and maintenance. Haile anticipates that DHEC will require staged-level monitoring at the Site that will be reduced or terminated (for specific facilities) over the life of the mine, based upon Haile demonstrating that its reclamation and closure designs meet physical and chemical performance standards on a facility-by-facility basis. *See* Appendix C for further details on reclamation, closure, and bonding.

Specifically, Haile anticipates that by the end of mining and milling operations in Year 14 of the Mine Schedule the following facilities will have been reclaimed and closed: all of the Green OSAs, the Holly and Hock TSF Borrow Areas, and three of the backfilled Mine Pits (Mill Zone, Snake and Haile Pits). Said differently, there will be no post-mining monitoring or maintenance requirements for the aforementioned facilities. Haile anticipates that Red Hill and Chase Pits will be reclaimed and closed in Year 16 of the Mine Schedule, after which time there will be no monitoring and maintenance requirements for these facilities. Haile anticipates that the Mill Site, with the exception of the Contact Water Treatment Plant, and certain other ancillary facilities will be reclaimed in Year 20 of the Mine Schedule, after which time there will be no monitoring or maintenance requirements for the Mill Site. Haile Anticipates that the Contact Water Treatment Plant and remaining ancillary facilities at the Mill Site will be reclaimed and closed in Year 43 of the Mine Schedule (once the TSF and Johnny's PAG have transitioned to passive treatment and the CWTP is no longer needed to treat the seepage), after which time there will be no monitoring or maintenance requirements for these facilities. Haile anticipates that the majority of the roads, pipelines, electrical lines and surface water controls will also have been reclaimed and closed by Year 43 of the Mine Schedule, after which time there will be no monitoring or maintenance requirements for these facilities. *See* Tables 4 and 5, below.

For the pit lakes, which will begin filling in Year 12 (Champion) and Year 13 (Ledbetter and Small) of the Mine Schedule, Haile anticipates that lime (to maintain a neutral pH until the water level inundates any potential acid generating material in the pit walls) will need to be added to Ledbetter Pit Lake for approximately 13 years and to Champion Pit for 17 years after filling commences in each of the pits (i.e., until approximately Years 26 and 30, respectively, of the Mine Schedule). *See* Tables 4 and 5, below. Small Pit is currently anticipated to require a long-term lime addition.[3] Water quality in the Pit Lakes will be monitored during pit refilling, until equilibrium is achieved (anticipated to be in Year 32 for Champion and Year 33 for Ledbetter and Small). Ten (10) years after the Ledbetter and Champion Pit Lakes have achieved equilibrium (i.e., approximately 95% full) Haile expects that monitoring will

[3] Once the revised groundwater modeling has been completed, these estimates may be revised.

be eliminated for these Pit Lakes (i.e., physical and chemical stability will have been demonstrated). Monitoring of Small Pit Lake would continue for the duration of the lime addition.

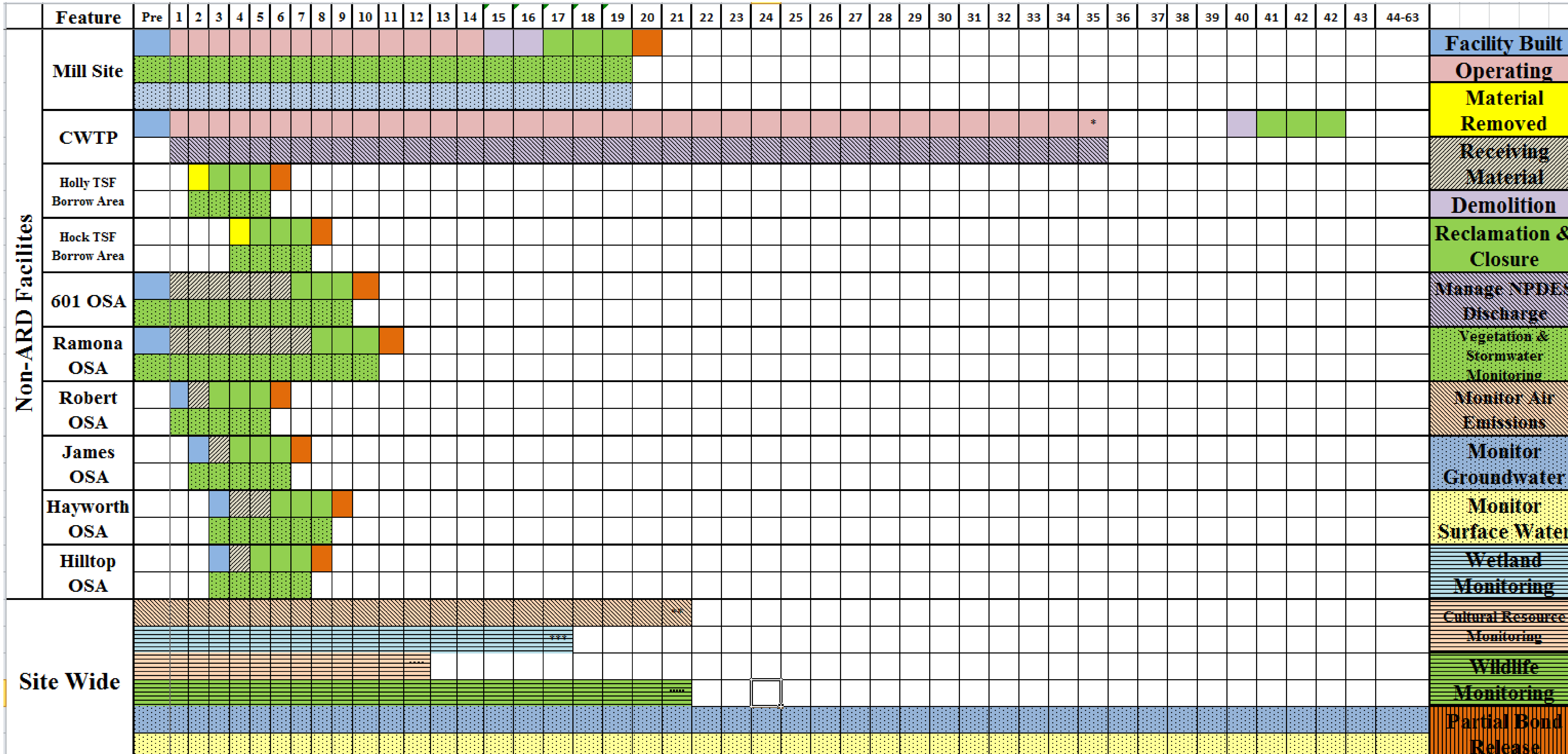
Haile anticipates that the outer embankment of the TSF will be seeded and stabilized as part of construction (i.e., during operations). Haile estimates that the TSF will have been reclaimed and the dam outlet notch and downchute constructed in Year 22 of the Mine Schedule, and will transition to a passive treatment system in Year 36. Once transitioned to a passive treatment system, Haile anticipates that long-term monitoring and management obligations at the TSF will consist of erosion control and removal of woody growth above the HDPE liner (approximately every 2-5 years), and the replacement of the organic media within the passive treatment cell (occurring approximately every 20 years, depending on the functionality of the cell).

Haile anticipates that Johnny's PAG will be reclaimed in Year 15 of the Mine Schedule, and will transition to a passive treatment system in Year 20. Once transitioned to a passive treatment system, Haile anticipates that long-term monitoring and management obligations at Johnny's PAG will consist of erosion control and removal of woody growth above the HDPE liner (approximately every 2-5 years), and the replacement of the organic media within the passive treatment cells (occurring approximately every 20 years, depending on the functionality of the cells).

Post-mining monitoring and maintenance will also consist of surface and groundwater monitoring on a Site-wide basis beginning in Year 15 of the Mine Schedule (surface and groundwater will also be monitored during Years 0-14 as part of operations) and continue for approximately 30 years after the Pit Lakes reach equilibrium (i.e., until Year 63 of the Mine Schedule). *See* Section 3.2, below, for further details. However, it is expected that the intensity and frequency of the surface and groundwater monitoring would be decreased over time as performance standards are achieved, until eliminated. Contractor, sampling costs and a repair budget have been included in the post-mining monitoring and maintenance budget to accomplish these tasks. *See* Appendix C.

Importantly, however, DHEC and Haile will be better able to determine appropriate post-mining monitoring and management obligations, as well as the appropriate length of time for which these activities should occur, once reclamation activities are underway and more Site-specific information is available.

Table 4. Proposed General Mining Schedule for Pit Development and Site Reclamation



This visual presentation is based on Schafer, Draft Revised Post-Closure Water Quality Impact Evaluation (February 2013)

*CWTP operation ceases when TSF goes passive; conservative demolition date used

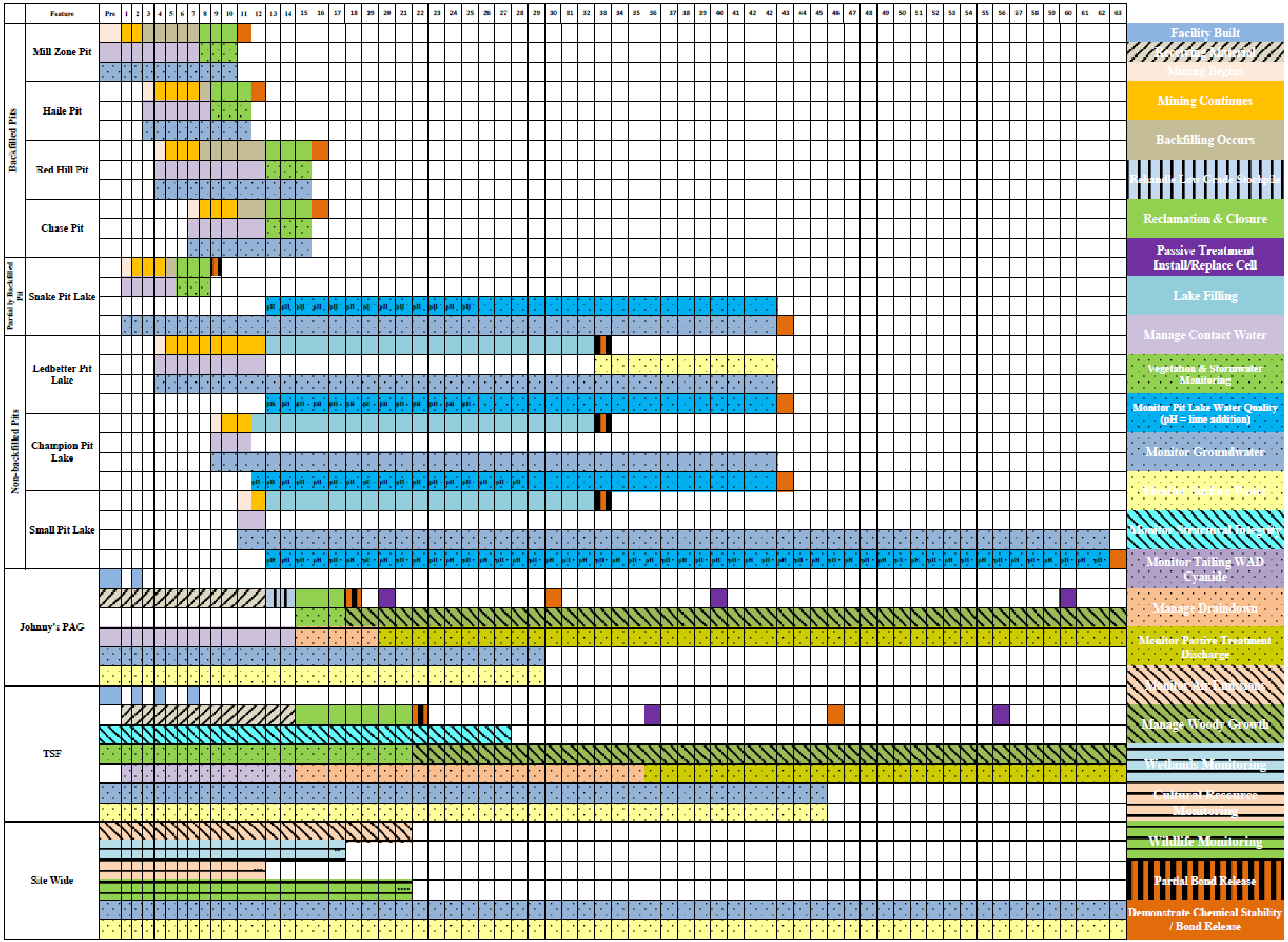
**Air monitoring ceases when TSF fully capped

***Wetland monitoring ceases five years after depressurization pumps turned off

****Cultural resource monitoring ceases when mining ceases

*****Wildlife monitoring ceases when TSF fully capped

Table 5. Proposed General Mining Schedule for Pit Development and Site Reclamation, Continued



This visual presentation is based on Schafer, Draft Revised Post-Closure Water Quality Impact Evaluation (February 2013)

*Air monitoring ceases when TSF fully capped

**Wetland monitoring ceases five years after depressurization pumps turned off

***Cultural resource monitoring ceases when mining ceases

****Wildlife monitoring ceases when TSF fully capped

3.2 Post-Mining Water Quality Monitoring

Haile expects that its Mining Permit will require post-mining monitoring of surface and groundwater beginning in Year 15 and continuing for approximately 30 years after the Pit Lakes reach equilibrium (approximately 95% full). However, Haile will work with DHEC to identify, based upon Site-specific information, the appropriate frequency, duration, and constituent list during this post-mining and post-closure water quality monitoring, which will be specified in State permits that will control.

Haile anticipates that a Site-wide post-mining monitoring program will be developed for the Site, which will be adapted from Haile's operational water quality plan. In addition, monitoring will be coordinated with requirements of State permits in effect. Overall objectives are to demonstrate that receiving waters are meeting water quality criteria. Secondarily, the plan will provide early warning of potential water impacts and a means of identifying contaminant sources. Finally, the plan will identify contingency actions that will be employed if monitoring objectives are not satisfied.

Haile will develop a detailed post-mining monitoring plan prior to Year 15 of the Mine Schedule, based on a continuation of the operational monitoring plan, and which will be informed by the monitoring that occurs during mining (e.g., analyte sampling). The plan will include sampling sites in surface and groundwater that provide up-gradient and down-gradient monitoring and will, among other requirements:

- Identify specific groundwater and surface water monitoring locations
- Identify constituents to be monitored at each location
- Specify monitoring frequency for each location
- Specify sampling procedures

The post-mining monitoring plan will be designed to assure:

- Surface and ground waters are monitored up gradient and down gradient of permanent post mining features.
- There is monitoring in place between any potential sources of contamination and receiving waters that allows for adequate identification of potential sources of contamination migration.
- All discharges are monitored in accordance with applicable regulation.
- Post mining monitoring for a period specified by regulation or agency requirements.

Groundwater monitoring will be used to determine the performance of closed facilities that have the potential for subsurface discharges. Selected wells will be used to assess the potential loads contributed to groundwater from various facilities. A number of groundwater and surface water monitoring points, selected from those remaining at mine closure, will be designated for continued post-mining monitoring. These points will be selected in consultation with DHEC for their ability to provide pertinent information on up gradient and down gradient water quality.

For purposes of bond calculations, it is assumed that thirteen groundwater sites and six surface water sites, exclusive of monitoring at the pit lakes, will be monitored in the vicinity of the mine, processing facilities, and TSF. For purposes of bond calculations, the frequency and number of monitoring sites has been varied to respond to expected Site conditions between Years 15 and 63 of the Mine Schedule. Actual monitoring locations will be designated in plans submitted to DHEC before final reclamation commences.

Based on early post-mining monitoring, the parameter list and sampling frequency may be adjusted to reflect the observed conditions. The parameters analyzed for will be selected based on parameters observed during operations and having the potential to adversely impact water quality downstream.

4 RECLAMATION COST AND BOND ASSURANCE

Appendix C provides Haile's reclamation costs and bond assurance calculations. Although the costs are presented by year (Pre-Production through Year 63) in Tables 1-6 of Appendix C, the actual timing of the posting of financial assurance, as well as the portion of the financial assurance posted within particular time periods is subject to regulation by, and further discussions with DHEC. For example, the Pre-Production period may be in excess of a year, and the Tables do not provide specific times within that period (or any other years) when all or any part of the financial assurance will be required. Appendix D provides information about the assumptions and information Haile used to estimate the reclamation costs and bond assurance calculations presented in Appendix C.

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Appendix A

HAILE GOLD MINE INC.
SOIL EROSION MODELING
JOHNNY'S PAG AND TSF
FINAL REPORT

August 08, 2013

Submitted to:

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Project 7420136300E

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FIGURES

ATTACHMENTS

1.0 INTRODUCTION

AMEC Environment & Infrastructure, Inc. (AMEC) has conducted an analysis of soil erosion and sediment delivery for Johnny's PAG and Tailing Storage Facility (TSF) at the Haile Gold Mine near the town of Kershaw in Lancaster County, South Carolina. The analysis was completed using the RUSLE2 computer program Version 1.26.6.4. The following is a description of AMEC's findings.

2.0 SOIL SURVEY DATA

U.S. Department of Agriculture (USDA) Soil Web Survey data was used to prepare customized soil resource reports for both the TSF and Johnny's PAG.

The result of the soil survey for the Johnny's PAG site indicates that the majority of the site (approximately 85%) is composed of Blanton Sand (BnB and BnC) with slopes varying from 0 to 15% and the remaining approximately 15% is composed of Rutlege and Blaney loamy sand. AMEC also reviewed the soil data for the areas that may be used as sources for the growth media material. The soil survey shows the majority of the growth media material in this area is composed of Blanton Sand with Hydrologic Soil Group “A”.

The soil survey for the TSF indicates that approximately 75% of the soil in this area is Blanton Sand with slopes varying from 0 to 15% and the remaining 25% is composed of Rutlege loamy sand and Wagram sand. The soil materials in this site have Hydrologic Soil Group A and are moderately well drained. Detailed soil reports for the TSF and Johnny's PAG sites are presented in Attachment A.

3.0 SURFACE AREA CALCULATIONSE

Existing drawing sheets from the Draft Project Description (Appendix A, submitted to the USACE on February 22, 2013) were used to calculate the approximate surface areas for each site upon closure.[1] Johnny's PAG will be composed of 3 acres of relatively flat areas (plateau) and 141 acres of terraces (benches) and slopes for a total of 144 acres. The elevation will change from 760 feet (ft) on the plateau to 520 ft at the base of the slope with an average slope of approximately 33%.

The TSF will have an area of approximately 394 acres with elevation varying from over 630 ft to 610 ft at the outlet. The tailing surface will have a relatively flat slope (less than 0.5%).

Attachment B illustrates the area calculations for each site and subarea.

[1] The acreage calculation does not included ancillary facilities around the overburden (ditches, channels, roads, ponds, etc.), and thus is slightly different from the 159 acres reported elsewhere for the footprint of Johnny's PAG. The approximately 394 acres indicated for the TSF represents the estimated acreage for the tailings surface and does not include the disturbance associated with the embankment or ancillary facilities associated with the TSF. The total disturbance footprint including the embankment and ancillary facilities is approximately 524 acres.

4.0 SOIL EROSION AND SEDIMENT DELIVERY COMPUTATIONS

The Revised Universal Soil Loss Equation (RUSLE2) computer program was used to compute soil loss and sediment delivery for each site.[2]

The analysis was performed for the following conditions:

1. Johnny's PAG with no vegetation cover and an average slope of 33%.
2. Johnny's PAG plateau area with vegetation cover similar to Haile's proposed seed mix.[3]
3. Johnny's PAG slope areas (average slope of 33%) and drainage terrace channels with vegetation cover similar to Haile's proposed seed mix.
4. TSF with an average slope of 0.5%, and vegetation cover similar to Haile's proposed seed mix.

The results of these analyses are summarized as follows:

- Johnny's PAG with no vegetation cover and an average slope of 33%: soil loss 53.2 tons/acre/year
- Johnny's PAG plateau areas with vegetation cover similar to Haile's proposed seed mix: soil loss 0.57 tons/acre/year
- Johnny's PAG slope areas (average slope of 33%) and drainage terrace channels with vegetation cover similar to Haile's proposed seed mix: soil loss 2.41 tons/acre/year
- TSF with an average slope of 0.5%, and vegetation cover similar to Haile's proposed seed mix: soil loss 0.12 tons/acre/year

Figure 1 illustrates monthly variations of rainfall and monthly soil loss per acre for both Johnny's PAG and TSF reclamation areas.

[2] The RUSLE model automatically defines the precipitation based on county. The mean annual precipitation used in the RUSLE model is 42 inches, while the mean annual precipitation that Haile's consultant ERC has presented in previous reports to the USACE is 45.68 inches, which are generally similar. For conservatism, however, the RUSLE soil loss estimates have been increased by 8%, which is the percentage that the mean monthly site precipitation exceeds the RUSLE precipitation.

[3] The RUSLE2 model has only select vegetation species mixes available. The seed mix utilized was the one that most closely resembled Haile's proposed seed mix. The seed mix used in the model is provided in Attachment C.

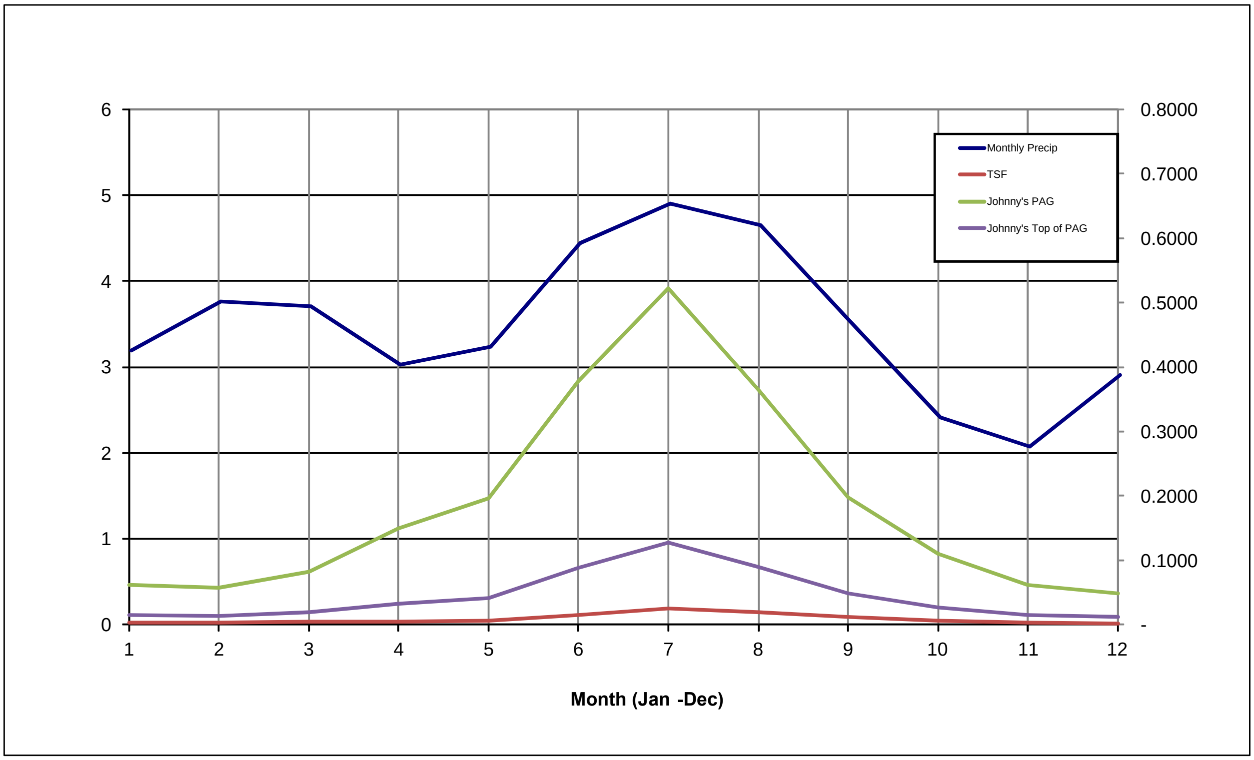

Figure 1 - Average Monthly Rainfall and Soil Loss Johnny's PAG & TSF (Haile Gold Mine Lancaster County, SC)

Attachment C presents the detailed input and output for the RUSLE2 model with calculated monthly soil losses for each scenario. Appendix C also identifies the seed mix used in the calculation.

Tables 1 through 3 show soil loss and sediment delivery computations for both reclamation sites, and include total annual sediment delivery from each site. Table 2 provides the computations for both Johnny's PAG plateau and slope areas.[4]

[4] The RUSLE2 model program runs the analysis for Johnny's PAG as one facility but separates the top surface from the side slopes. Thus, the results for Johnny's PAG (without vegetation cover and with vegetation cover) are provided in the first Tables 1 and 2, respectively.

Table 1 - Table 1 - Erosion Loss and Sediment Delivery for Johnny's PAG - No Vegetation / Bare Land Scenario

Johnny's PAG Area Calculation			Johnny's PAG Erosion Loss and Sediment Delivery						
Elevation Interval	Reclamation Area (sqft)	Bench Area (sqft)	PAG Areas (acres)	Terraces Areas (acres)	Total Areas in each Intervals (acres)	Soil Loss (t/ac/yr)	Soil Loss (Tons/Yr)	Sediment Delivery (t/ac/yr)	Sediment Delivery (Tons/Yr)
760_Plateau	130,581		3.00		3.0	59	176.87	59	176.87
					Johnny's Plateau Area		**177**		**177**
Johnny's PAG Area									
760-740	131,097	30,967	3.0	0.71	3.7	59	219.51	59	219.51
740_Plateau	49,942		1.1	0.00	1.1	59	67.64	59	67.64
740-720	297,638	65,141	6.8	1.50	8.3	59	491.37	59	491.37
720-700	339,033	70,447	7.8	1.62	9.4	59	554.62	59	554.62
700-680	365,160	75,339	8.4	1.73	10.1	59	596.63	59	596.63
680-660	388,247	79,966	8.9	1.84	10.7	59	634.17	59	634.17
660-640	411,331	84,556	9.4	1.94	11.4	59	671.66	59	671.66
640-620	434,378	89,185	10.0	2.05	12.0	59	709.14	59	709.14
620-600	456,899	93,622	10.5	2.15	12.6	59	745.66	59	745.66
600-580	478,778	97,887	11.0	2.25	13.2	59	781.07	59	781.07
580-560	500,032	102,124	11.5	2.34	13.8	59	815.59	59	815.59
560-540	520,824	106,005	12.0	2.43	14.4	59	849.01	59	849.01
540-520	482,925	75,052	11.1	1.72	12.8	59	755.75	59	755.75
520-STACK EDGE	325,788		7.5		7.5	59	441.27	59	441.27
	6,152,365				**Johnny's PAG Area**		**8333**		**8333**
Total	**6,282,946**	**Sq Ft**	**122**	**22**	**144**		**8,510**		**8,510**
							Total Soil Loss per Year =	**8,510 Tons per year**	
							Total Sediment Delivery=	**8,510 Tons per Year**	

Table 2 - Erosion Loss and Sediment Delivery for Johnny's PAG - Hydroseeding and Vegetation Management Scenario

Johnny's PAG Area Calculation			Johnny's PAG Erosion Loss and Sediment Delivery						
Elevation Interval	Reclamation Area (sqft)	Bench Area (sqft)	PAG Areas (acres)	Terraces Areas (acres)	Total Areas in each Intervals (acres)	Soil Loss (t/ac/yr)	Soil Loss (Tons/Yr)	Sediment Delivery (t/ac/yr)	Sediment Delivery (Tons/Yr)
760_Plateau	130,581		3.00		3.0	0.53	1.59	0.5	1.50
					Johnny's Plateau Area		**1.6**		**1.5**
Johnny's PAG Area									
760-740	131,097	30,967	3.0	0.71	3.7	2.23	8.30	2	7.44
740_Plateau	49,942		1.1	0.00	1.1	2.23	2.56	2	2.29
740-720	297,638	65,141	6.8	1.50	8.3	2.23	18.57	2	16.66
720-700	339,033	70,447	7.8	1.62	9.4	2.23	20.96	2	18.80
700-680	365,160	75,339	8.4	1.73	10.1	2.23	22.55	2	20.22
680-660	388,247	79,966	8.9	1.84	10.7	2.23	23.97	2	21.50
660-640	411,331	84,556	9.4	1.94	11.4	2.23	25.39	2	22.77
640-620	434,378	89,185	10.0	2.05	12.0	2.23	26.80	2	24.04
620-600	456,899	93,622	10.5	2.15	12.6	2.23	28.18	2	25.28
600-580	478,778	97,887	11.0	2.25	13.2	2.23	29.52	2	26.48
580-560	500,032	102,124	11.5	2.34	13.8	2.23	30.83	2	27.65
560-540	520,824	106,005	12.0	2.43	14.4	2.23	32.09	2	28.78
540-520	482,925	75,052	11.1	1.72	12.8	2.23	28.56	2	25.62
520-STACK EDGE	325,788		7.5		7.5	2.23	16.68	2	14.96
	6,152,365				**Johnny's PAG Area**		**315**		**282**
Total	**6,282,946**	**Sq Ft**	**122**	**22**	**144**		**318**		**285**
							Total Soil Loss per Year =	**318 Tons per year**	
							Total Sediment Delivery=	**285 Tons per Year**	

Table 3 - Erosion Loss and Sediment Delivery for TSF - Hydroseeding and Vegetation Management Scenario

Tailing Storage Facility (TSF) Sediment Loss and Delivery Calculation Area Calculation

Elevation Interval	Reclamation Area (sqft)	Soil Loss (t/ac/yr)	Soil Loss (Tons/Yr)	Sediment Delivery (t/ac/yr)	Sediment Delivery (Tons/Yr)
Greater than 630	21.86	0.106	2.32	0.091	1.99
630-625	67.22	0.106	7.13	0.091	6.12
625-620	95.18	0.106	10.09	0.091	8.66
620-615	90.85	0.106	9.63	0.091	8.27
615-610	79.47	0.106	8.42	0.091	7.23
Less than 610	38.91	0.106	4.12	0.091	3.54
Total	**393.5**		**42**		**36**

Total Soil Loss per Year =	**42 Tons per year**
Total Sediment Delivery=	**36 Tons per Year**

5.0 SUMMARY

The average depth of soil loss per year for each scenario is expected to be as follows:

- Johnny's PAG with no vegetation cover and an average slope of 33%: depth of soil loss approximately 11.3 millimeters (0.445 inches)per year
- Johnny's PAG plateau areas with vegetation cover similar to Haile's proposed seed mix: depth of soil loss approximately 0.11 millimeters (0.0043 inches) per year
- Johnny's PAG slope areas (average slope of 33%) and drainage terrace channels with vegetation cover similar to Haile's proposed seed mix: depth of soil loss approximately 0.43 millimeters (0.0169 inches) per year
- TSF with an average slope of 0.5%, and vegetation cover similar to Haile's proposed seed mix: depth of soil loss approximately 0.022 millimeters (0.0009 inches) per year

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ATTACHMENT A

Soil Reports for Johnny's PAG and TSF

United States Department of Agriculture

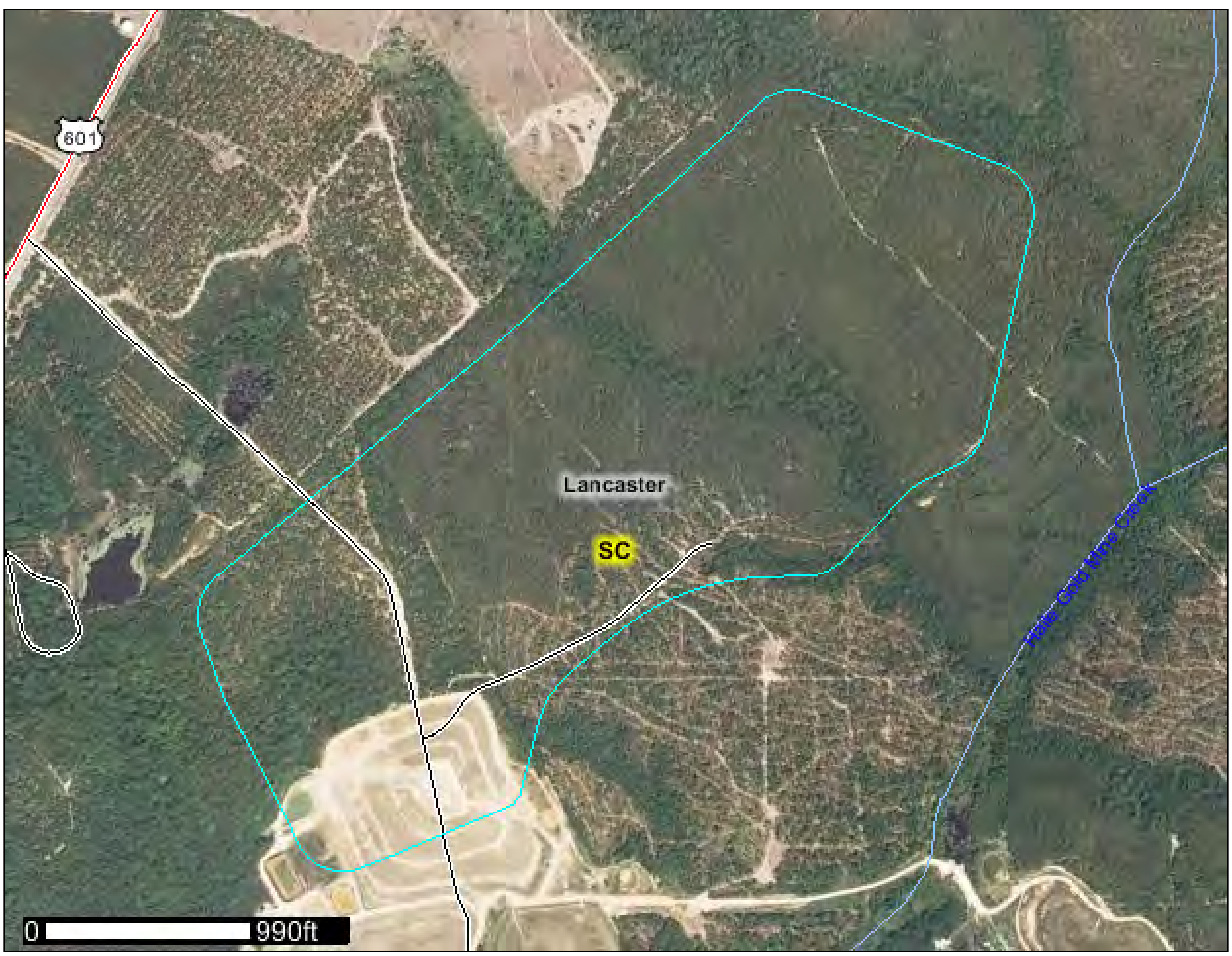
Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Lancaster County, South Carolina

Johnny's PAG



July 9, 2013

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:9,870 if printed on A size (8.5" x 11") sheet.

N

Meters: 0, 100, 200, 400, 600

Feet: 0, 500, 1,000, 2,000, 3,000

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Gully

Short Steep Slope

Other

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

MAP INFORMATION

Map Scale: 1:9,870 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 17N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lancaster County, South Carolina
Survey Area Data: Version 14, Oct 5, 2011

Date(s) aerial images were photographed: 6/11/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Lancaster County, South Carolina (SC057)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
BlC	Blaney sand, 6 to 10 percent slopes	1.0	0.6%
BnB	Blanton sand, 0 to 6 percent slopes	101.9	62.2%
BnC	Blanton sand, 6 to 15 percent slopes	35.6	21.7%
Ru	Rutlege loamy sand	10.1	6.2%
VbC	Vaucluse and Blaney loamy sands, 6 to 10 percent slopes	1.6	1.0%
VbD	Vaucluse and Blaney loamy sands, 10 to 15 percent slopes	13.6	8.3%
Totals for Area of Interest		**163.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Lancaster County, South Carolina

BlC—Blaney sand, 6 to 10 percent slopes

Map Unit Setting

Landscape: Sandhills
Mean annual precipitation: 38 to 53 inches
Mean annual air temperature: 49 to 73 degrees F
Frost-free period: 192 to 247 days

Map Unit Composition

Blaney and similar soils: 100 percent

Description of Blaney

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy marine deposits

Properties and qualities

Slope: 6 to 10 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 3s
Hydrologic Soil Group: B

Typical profile

0 to 4 inches: Sand
4 to 26 inches: Sand
26 to 50 inches: Sandy clay loam
50 to 72 inches: Sandy loam

BnB—Blanton sand, 0 to 6 percent slopes

Map Unit Setting

Landscape: Sandhills
Elevation: 50 to 250 feet
Mean annual precipitation: 38 to 53 inches
Mean annual air temperature: 49 to 73 degrees F

Frost-free period: 192 to 247 days

Map Unit Composition

Blanton and similar soils: 100 percent

Description of Blanton

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy marine deposits

Properties and qualities

Slope: 0 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (0.57 to 19.98 in/hr)
Depth to water table: About 48 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.4 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 3s
Hydrologic Soil Group: A

Typical profile

0 to 7 inches: Sand
7 to 63 inches: Sand
63 to 72 inches: Loamy sand

BnC—Blanton sand, 6 to 15 percent slopes

Map Unit Setting

Landscape: Sandhills
Elevation: 50 to 250 feet
Mean annual precipitation: 38 to 53 inches
Mean annual air temperature: 49 to 73 degrees F
Frost-free period: 192 to 247 days

Map Unit Composition

Blanton and similar soils: 100 percent

Description of Blanton

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex

Across-slope shape: Convex
Parent material: Sandy marine deposits

Properties and qualities
Slope: 6 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (0.57 to 19.98 in/hr)
Depth to water table: About 48 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.4 inches)

Interpretive groups
Farmland classification: Not prime farmland
Land capability (nonirrigated): 4s
Hydrologic Soil Group: A

Typical profile
0 to 7 inches: Sand
7 to 63 inches: Sand
63 to 72 inches: Loamy sand

Ru—Rutlege loamy sand

Map Unit Setting
Elevation: 0 to 300 feet
Mean annual precipitation: 38 to 53 inches
Mean annual air temperature: 49 to 73 degrees F
Frost-free period: 192 to 247 days

Map Unit Composition
Rutlege and similar soils: 100 percent

Description of Rutlege

Setting
Landform: Depressions, flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy marine deposits

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: None

Available water capacity: Low (about 4.0 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4w
Hydrologic Soil Group: B/D

Typical profile

0 to 21 inches: Loamy sand
21 to 60 inches: Loamy sand

VbC—Vaucluse and Blaney loamy sands, 6 to 10 percent slopes

Map Unit Setting

Landscape: Sandhills
Elevation: 100 to 450 feet
Mean annual precipitation: 38 to 53 inches
Mean annual air temperature: 49 to 73 degrees F
Frost-free period: 192 to 247 days

Map Unit Composition

Vaucluse and similar soils: 55 percent
Blaney and similar soils: 45 percent

Description of Vaucluse

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy marine deposits

Properties and qualities

Slope: 6 to 10 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.2 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 3e
Hydrologic Soil Group: C

Typical profile

0 to 3 inches: Loamy sand
3 to 11 inches: Loamy sand
11 to 16 inches: Sandy clay loam

16 to 32 inches: Sandy clay loam
32 to 53 inches: Sandy loam
53 to 72 inches: Loamy fine sand

Description of Blaney

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy marine deposits

Properties and qualities

Slope: 6 to 10 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 3s
Hydrologic Soil Group: B

Typical profile

0 to 4 inches: Sand
4 to 26 inches: Sand
26 to 50 inches: Sandy clay loam
50 to 72 inches: Sandy loam

VbD—Vaucluse and Blaney loamy sands, 10 to 15 percent slopes

Map Unit Setting

Landscape: Sandhills
Elevation: 100 to 450 feet
Mean annual precipitation: 38 to 53 inches
Mean annual air temperature: 49 to 73 degrees F
Frost-free period: 192 to 247 days

Map Unit Composition

Vaucluse and similar soils: 55 percent
Blaney and similar soils: 45 percent

Description of Vaucluse

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy marine deposits

Properties and qualities

Slope: 10 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.2 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4e
Hydrologic Soil Group: C

Typical profile

0 to 3 inches: Loamy sand
3 to 11 inches: Loamy sand
11 to 16 inches: Sandy clay loam
16 to 32 inches: Sandy clay loam
32 to 53 inches: Sandy loam
53 to 72 inches: Loamy fine sand

Description of Blaney

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
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Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4s
Hydrologic Soil Group: B

Typical profile

0 to 4 inches: Sand
4 to 26 inches: Sand
26 to 50 inches: Sandy clay loam
50 to 72 inches: Sandy loam

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United States Department of Agriculture

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for
Lancaster County, South Carolina

Tailing Storage Facility

June 15, 2013

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

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Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

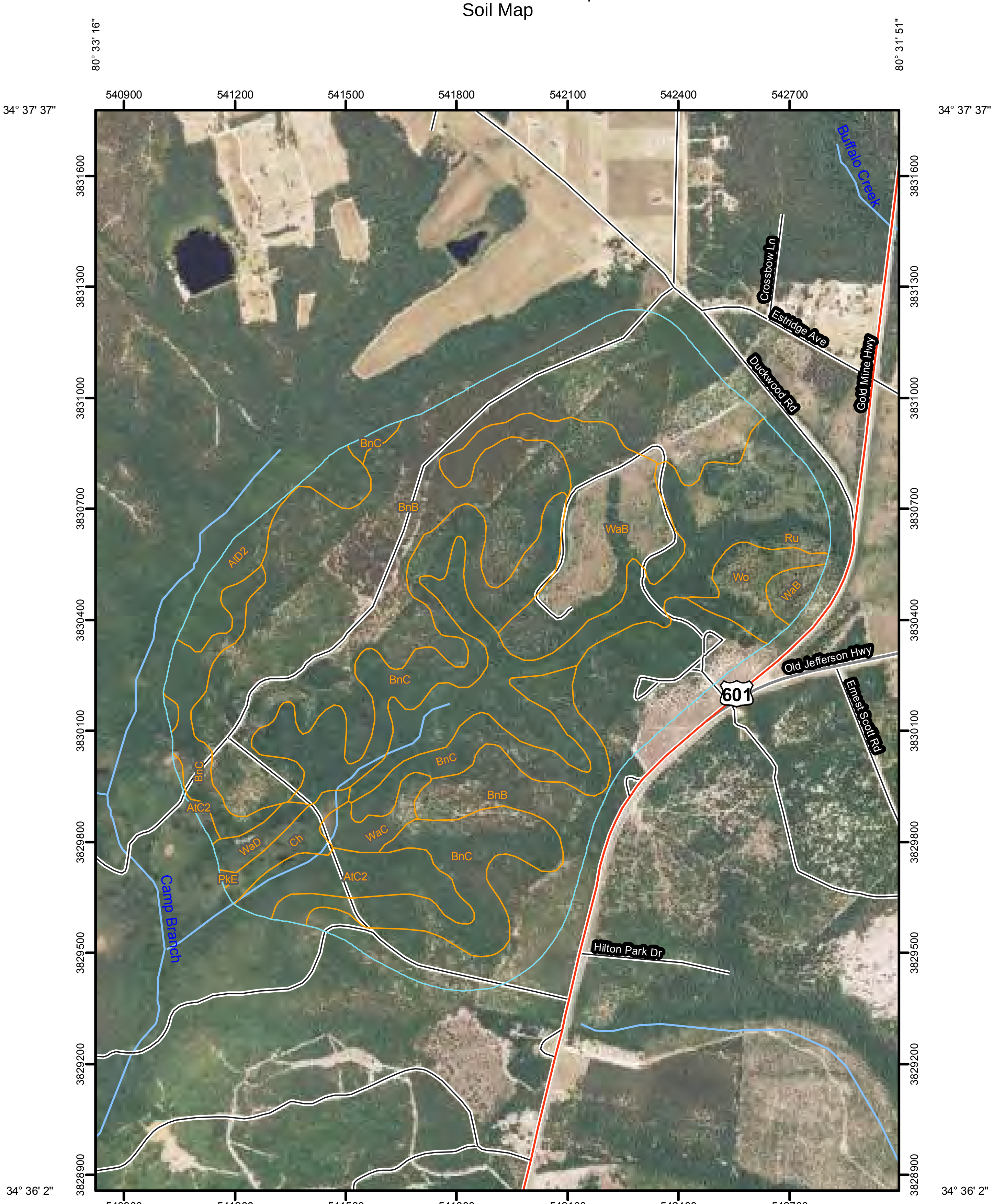
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



80° 33' 17"

80° 31' 52"

Map Scale: 1:13,900 if printed on A size (8.5" x 11") sheet.

N

Meters
0 100 200 400 600

Feet
0 500 1,000 2,000 3,000

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Gully

Short Steep Slope

Other

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

MAP INFORMATION

Map Scale: 1:13,900 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 17N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lancaster County, South Carolina
Survey Area Data: Version 14, Oct 5, 2011

Date(s) aerial images were photographed: 6/11/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Lancaster County, South Carolina (SC057)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
AtC2	Appling and Chesterfield soils, 6 to 10 percent slopes, eroded	18.2	3.6%
AtD2	Appling and Chesterfield soils, 10 to 15 percent slopes, eroded	14.0	2.8%
BnB	Blanton sand, 0 to 6 percent slopes	231.6	45.8%
BnC	Blanton sand, 6 to 15 percent slopes	102.7	20.3%
Ch	Chewacla soils	6.7	1.3%
PkE	Pickens slaty silt loam, 10 to 25 percent slopes	0.3	0.1%
Ru	Rutlege loamy sand	63.0	12.5%
WaB	Wagram sand, 2 to 6 percent slopes	46.9	9.3%
WaC	Wagram sand, 6 to 10 percent slopes	6.6	1.3%
WaD	Wagram sand, 10 to 15 percent slopes	4.5	0.9%
Wo	Worsham fine sandy loam	10.8	2.1%
Totals for Area of Interest		**505.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Lancaster County, South Carolina

AtC2—Appling and Chesterfield soils, 6 to 10 percent slopes, eroded

Map Unit Setting

Landscape: Piedmonts
Mean annual precipitation: 38 to 53 inches
Mean annual air temperature: 49 to 73 degrees F
Frost-free period: 192 to 247 days

Map Unit Composition

Appling and similar soils: 100 percent

Description of Appling

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from granite and gneiss

Properties and qualities

Slope: 6 to 10 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.9 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 3e
Hydrologic Soil Group: B

Typical profile

0 to 7 inches: Fine sandy loam
7 to 30 inches: Clay
30 to 46 inches: Sandy clay
46 to 72 inches: Silty clay loam

AtD2—Appling and Chesterfield soils, 10 to 15 percent slopes, eroded

Map Unit Setting

Landscape: Piedmonts
Mean annual precipitation: 38 to 53 inches
Mean annual air temperature: 49 to 73 degrees F

Frost-free period: 192 to 247 days

Map Unit Composition

Appling and similar soils: 100 percent

Description of Appling

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Clayey residuum weathered from granite and gneiss

Properties and qualities

Slope: 10 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.9 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4e
Hydrologic Soil Group: B

Typical profile

0 to 7 inches: Fine sandy loam
7 to 30 inches: Clay
30 to 46 inches: Sandy clay
46 to 72 inches: Silty clay loam

BnB—Blanton sand, 0 to 6 percent slopes

Map Unit Setting

Landscape: Sandhills
Elevation: 50 to 250 feet
Mean annual precipitation: 38 to 53 inches
Mean annual air temperature: 49 to 73 degrees F
Frost-free period: 192 to 247 days

Map Unit Composition

Blanton and similar soils: 100 percent

Description of Blanton

Setting

Landform: Marine terraces

Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy marine deposits

Properties and qualities

Slope: 0 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (0.57 to 19.98 in/hr)
Depth to water table: About 48 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.4 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 3s
Hydrologic Soil Group: A

Typical profile

0 to 7 inches: Sand
7 to 63 inches: Sand
63 to 72 inches: Loamy sand

BnC—Blanton sand, 6 to 15 percent slopes

Map Unit Setting

Landscape: Sandhills
Elevation: 50 to 250 feet
Mean annual precipitation: 38 to 53 inches
Mean annual air temperature: 49 to 73 degrees F
Frost-free period: 192 to 247 days

Map Unit Composition

Blanton and similar soils: 100 percent

Description of Blanton

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy marine deposits

Properties and qualities

Slope: 6 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (0.57 to 19.98 in/hr)

Depth to water table: About 48 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.4 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4s
Hydrologic Soil Group: A

Typical profile

0 to 7 inches: Sand
7 to 63 inches: Sand
63 to 72 inches: Loamy sand

Ch—Chewacla soils

Map Unit Setting

Landscape: River valleys
Mean annual precipitation: 38 to 53 inches
Mean annual air temperature: 49 to 73 degrees F
Frost-free period: 192 to 247 days

Map Unit Composition

Chewacla and similar soils: 90 percent
Minor components: 5 percent

Description of Chewacla

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water capacity: High (about 11.7 inches)

Interpretive groups

Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
Land capability (nonirrigated): 3w
Hydrologic Soil Group: C

Typical profile

0 to 7 inches: Silt loam
7 to 38 inches: Silt loam
38 to 50 inches: Silty clay loam
50 to 65 inches: Silty clay loam

Minor Components

Wehadkee

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

PkE—Pickens slaty silt loam, 10 to 25 percent slopes

Map Unit Setting

Landscape: Piedmonts
Elevation: 350 to 1,000 feet
Mean annual precipitation: 38 to 53 inches
Mean annual air temperature: 49 to 73 degrees F
Frost-free period: 192 to 247 days

Map Unit Composition

Manteo and similar soils: 100 percent

Description of Manteo

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Silty residuum weathered from argillite and serecite schist

Properties and qualities

Slope: 10 to 25 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 0.28 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.4 inches)

Interpretive groups

Farmland classification: Not prime farmland

Land capability (nonirrigated): 7e
Hydrologic Soil Group: C/D

Typical profile
0 to 7 inches: Channery silt loam
7 to 20 inches: Extremely channery silt loam
20 to 26 inches: Bedrock

Ru—Rutlege loamy sand

Map Unit Setting
Elevation: 0 to 300 feet
Mean annual precipitation: 38 to 53 inches
Mean annual air temperature: 49 to 73 degrees F
Frost-free period: 192 to 247 days

Map Unit Composition
Rutlege and similar soils: 100 percent

Description of Rutlege

Setting
Landform: Depressions, flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy marine deposits

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.0 inches)

Interpretive groups
Farmland classification: Not prime farmland
Land capability (nonirrigated): 4w
Hydrologic Soil Group: B/D

Typical profile
0 to 21 inches: Loamy sand
21 to 60 inches: Loamy sand

WaB—Wagram sand, 2 to 6 percent slopes

Map Unit Setting

Landscape: Sandhills
Mean annual precipitation: 38 to 53 inches
Mean annual air temperature: 49 to 73 degrees F
Frost-free period: 192 to 247 days

Map Unit Composition

Wagram and similar soils: 100 percent

Description of Wagram

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy and sandy marine deposits

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.1 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 2s
Hydrologic Soil Group: A

Typical profile

0 to 8 inches: Sand
8 to 25 inches: Sand
25 to 74 inches: Sandy clay loam

WaC—Wagram sand, 6 to 10 percent slopes

Map Unit Setting

Landscape: Sandhills
Mean annual precipitation: 38 to 53 inches
Mean annual air temperature: 49 to 73 degrees F

Frost-free period: 192 to 247 days

Map Unit Composition

Wagram and similar soils: 100 percent

Description of Wagram

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy and sandy marine deposits

Properties and qualities

Slope: 6 to 10 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.1 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 3s
Hydrologic Soil Group: A

Typical profile

0 to 8 inches: Sand
8 to 25 inches: Sand
25 to 74 inches: Sandy clay loam

WaD—Wagram sand, 10 to 15 percent slopes

Map Unit Setting

Landscape: Sandhills
Mean annual precipitation: 38 to 53 inches
Mean annual air temperature: 49 to 73 degrees F
Frost-free period: 192 to 247 days

Map Unit Composition

Wagram and similar soils: 100 percent

Description of Wagram

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex

Parent material: Loamy and sandy marine deposits

Properties and qualities

Slope: 10 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.1 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4s
Hydrologic Soil Group: A

Typical profile

0 to 8 inches: Sand
8 to 25 inches: Sand
25 to 74 inches: Sandy clay loam

Wo—Worsham fine sandy loam

Map Unit Setting

Landscape: River valleys
Mean annual precipitation: 38 to 53 inches
Mean annual air temperature: 49 to 73 degrees F
Frost-free period: 192 to 247 days

Map Unit Composition

Worsham and similar soils: 100 percent

Description of Worsham

Setting

Landform: Depressions
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Clayey alluvium

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 6 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.6 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 5w
Hydrologic Soil Group: D

Typical profile

0 to 6 inches: Fine sandy loam
6 to 16 inches: Sandy clay loam
16 to 45 inches: Clay loam
45 to 60 inches: Sandy loam

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United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Lancaster County, South Carolina

Fill Materials Soil Classifications

July 9, 2013

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

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Contents

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Gully

Short Steep Slope

Other

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

MAP INFORMATION

Map Scale: 1:4,140 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 17N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lancaster County, South Carolina
Survey Area Data: Version 14, Oct 5, 2011

Date(s) aerial images were photographed: 6/11/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Lancaster County, South Carolina (SC057)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
BlC	Blaney sand, 6 to 10 percent slopes	29.6	52.1%
BnB	Blanton sand, 0 to 6 percent slopes	25.3	44.4%
BnC	Blanton sand, 6 to 15 percent slopes	1.2	2.2%
Ru	Rutlege loamy sand	0.7	1.3%
Totals for Area of Interest		**56.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Lancaster County, South Carolina

BlC—Blaney sand, 6 to 10 percent slopes

Map Unit Setting

Landscape: Sandhills
Mean annual precipitation: 38 to 53 inches
Mean annual air temperature: 49 to 73 degrees F
Frost-free period: 192 to 247 days

Map Unit Composition

Blaney and similar soils: 100 percent

Description of Blaney

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy marine deposits

Properties and qualities

Slope: 6 to 10 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 3s
Hydrologic Soil Group: B

Typical profile

0 to 4 inches: Sand
4 to 26 inches: Sand
26 to 50 inches: Sandy clay loam
50 to 72 inches: Sandy loam

BnB—Blanton sand, 0 to 6 percent slopes

Map Unit Setting

Landscape: Sandhills
Elevation: 50 to 250 feet
Mean annual precipitation: 38 to 53 inches
Mean annual air temperature: 49 to 73 degrees F

Frost-free period: 192 to 247 days

Map Unit Composition

Blanton and similar soils: 100 percent

Description of Blanton

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy marine deposits

Properties and qualities

Slope: 0 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (0.57 to 19.98 in/hr)
Depth to water table: About 48 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.4 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 3s
Hydrologic Soil Group: A

Typical profile

0 to 7 inches: Sand
7 to 63 inches: Sand
63 to 72 inches: Loamy sand

BnC—Blanton sand, 6 to 15 percent slopes

Map Unit Setting

Landscape: Sandhills
Elevation: 50 to 250 feet
Mean annual precipitation: 38 to 53 inches
Mean annual air temperature: 49 to 73 degrees F
Frost-free period: 192 to 247 days

Map Unit Composition

Blanton and similar soils: 100 percent

Description of Blanton

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex

Across-slope shape: Convex
Parent material: Sandy marine deposits

Properties and qualities

Slope: 6 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (0.57 to 19.98 in/hr)
Depth to water table: About 48 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.4 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4s
Hydrologic Soil Group: A

Typical profile

0 to 7 inches: Sand
7 to 63 inches: Sand
63 to 72 inches: Loamy sand

Ru—Rutlege loamy sand

Map Unit Setting

Elevation: 0 to 300 feet
Mean annual precipitation: 38 to 53 inches
Mean annual air temperature: 49 to 73 degrees F
Frost-free period: 192 to 247 days

Map Unit Composition

Rutlege and similar soils: 100 percent

Description of Rutlege

Setting

Landform: Depressions, flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy marine deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: None

Available water capacity: Low (about 4.0 inches)

Interpretive groups

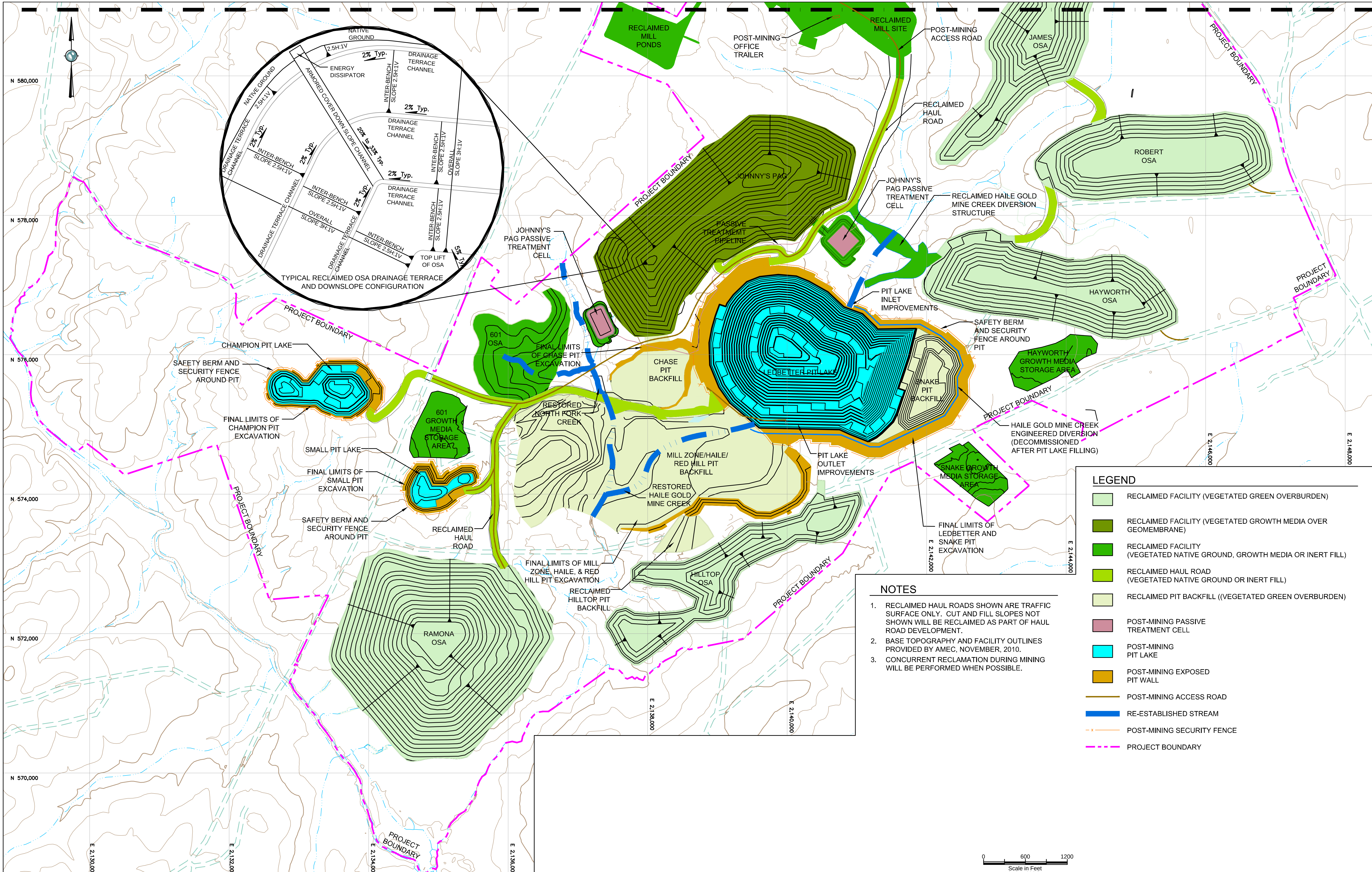
Farmland classification: Not prime farmland
Land capability (nonirrigated): 4w
Hydrologic Soil Group: B/D

Typical profile

0 to 21 inches: Loamy sand
21 to 60 inches: Loamy sand

ATTACHMENT B

Surface Area Calculations

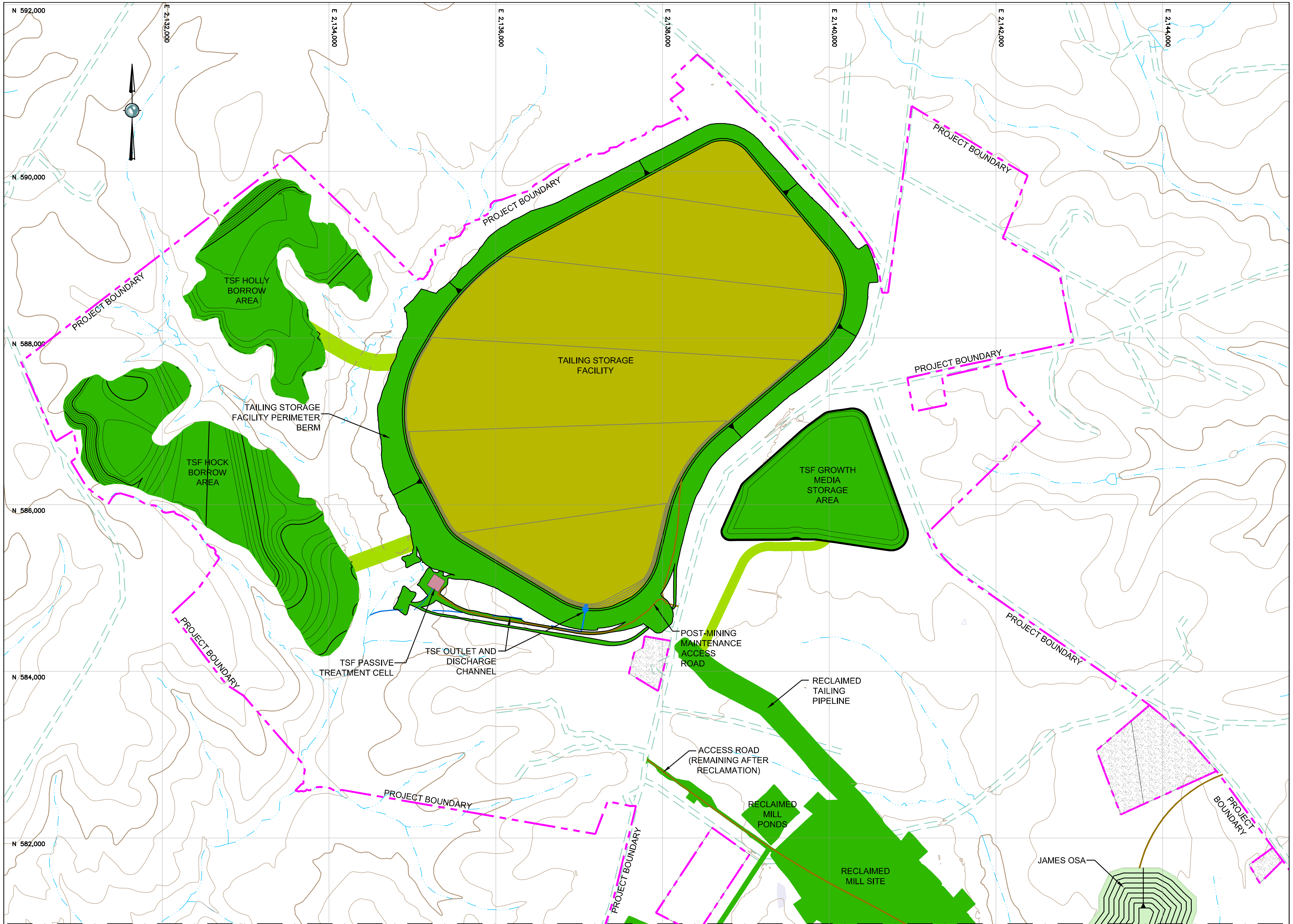


NOTES

1. RECLAIMED HAUL ROADS SHOWN ARE TRAFFIC SURFACE ONLY. CUT AND FILL SLOPES NOT SHOWN WILL BE RECLAIMED AS PART OF HAUL ROAD DEVELOPMENT.
2. BASE TOPOGRAPHY AND FACILITY OUTLINES PROVIDED BY AMEC, NOVEMBER, 2010.
3. CONCURRENT RECLAMATION DURING MINING WILL BE PERFORMED WHEN POSSIBLE.

LEGEND

- RECLAIMED FACILITY (VEGETATED GREEN OVERBURDEN)
- RECLAIMED FACILITY (VEGETATED GROWTH MEDIA OVER GEOMEMBRANE)
- RECLAIMED FACILITY (VEGETATED NATIVE GROUND, GROWTH MEDIA OR INERT FILL)
- RECLAIMED HAUL ROAD (VEGETATED NATIVE GROUND OR INERT FILL)
- RECLAIMED PIT BACKFILL ((VEGETATED GREEN OVERBURDEN)
- POST-MINING PASSIVE TREATMENT CELL
- POST-MINING PIT LAKE
- POST-MINING EXPOSED PIT WALL
- POST-MINING ACCESS ROAD
- RE-ESTABLISHED STREAM
- POST-MINING SECURITY FENCE
- PROJECT BOUNDARY



LEGEND

- RECLAIMED FACILITY (VEGETATED GREEN OVERBURDEN)
- RECLAIMED FACILITY (VEGETATED GROWTH MEDIA OVER GEOMEMBRANE)
- RECLAIMED FACILITY (VEGETATED NATIVE GROUND, GROWTH MEDIA OR INERT FILL)
- RECLAIMED HAUL ROAD (VEGETATED NATIVE GROUND OR INERT FILL)
- POST-MINING ACCESS ROAD
- PROJECT BOUNDARY

NOTES

1. RECLAIMED HAUL ROADS SHOWN ARE TRAFFIC SURFACE ONLY. CUT AND FILL SLOPES NOT SHOWN WILL BE RECLAIMED AS PART OF HAUL ROAD DEVELOPMENT.
2. BASE TOPOGRAPHY AND FACILITY OUTLINES PROVIDED BY AMEC, NOVEMBER, 2010.
3. CONCURRENT RECLAMATION DURING MINING WILL BE PERFORMED WHEN POSSIBLE.

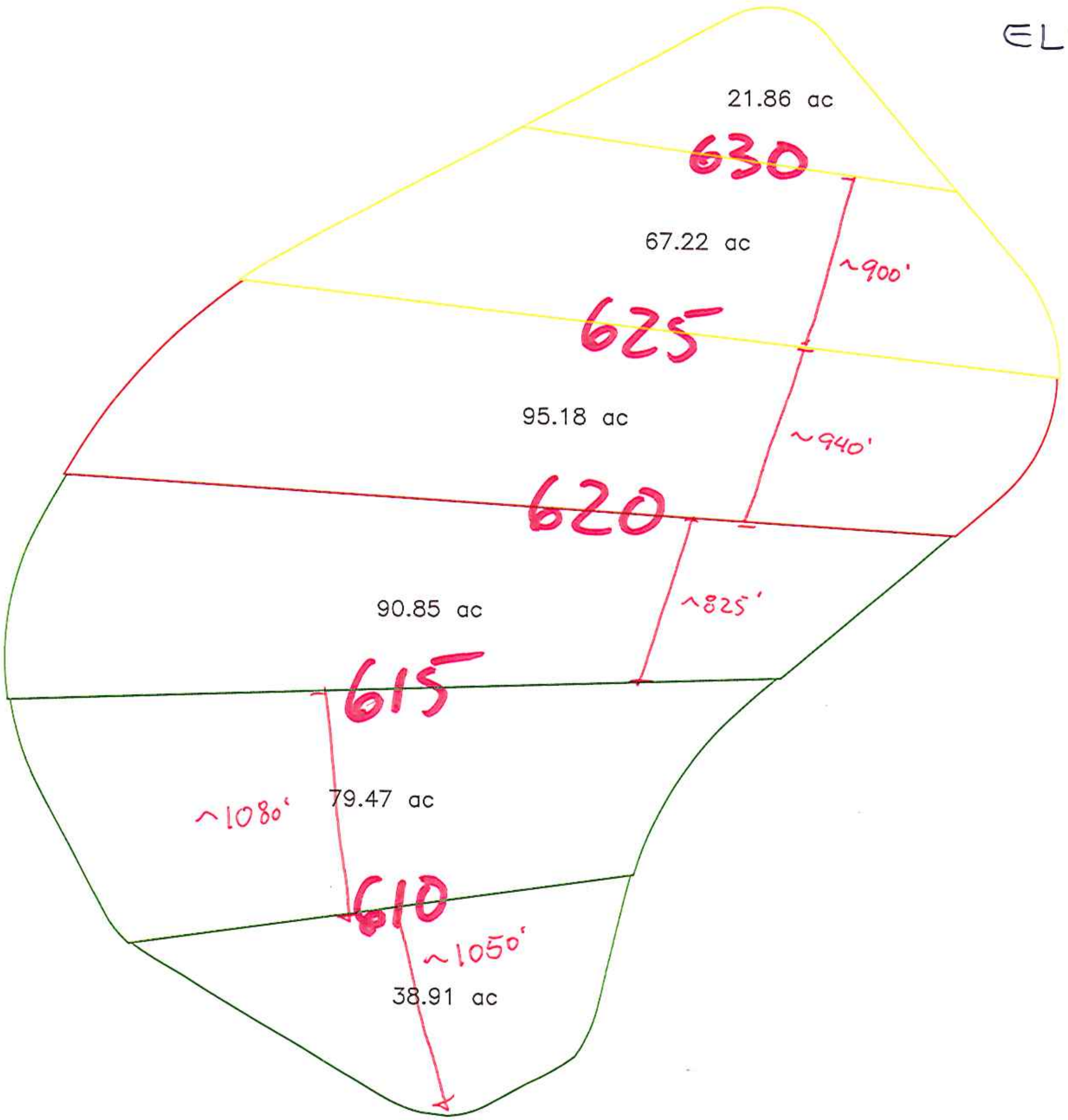
0 600 1200

Scale in Feet

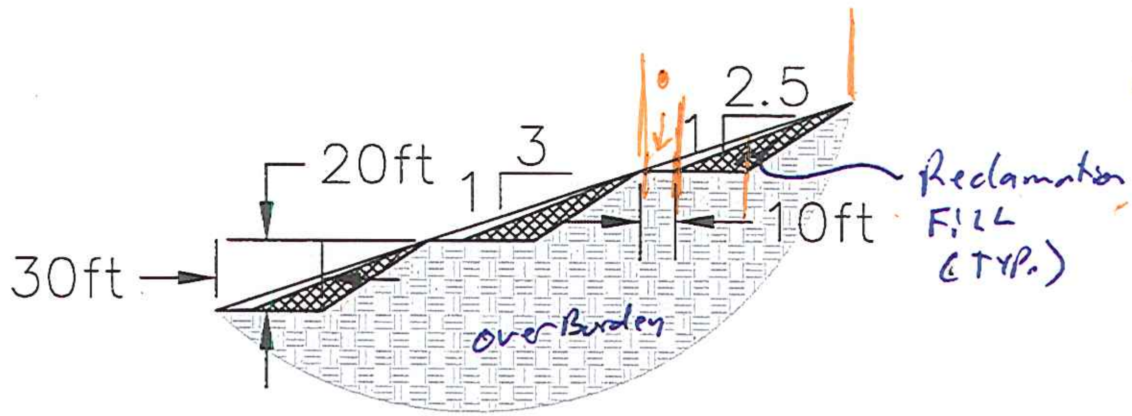
1 inch = 600 feet

DUCKWOOD TSF AREA &

ELEVATION CONTOURS

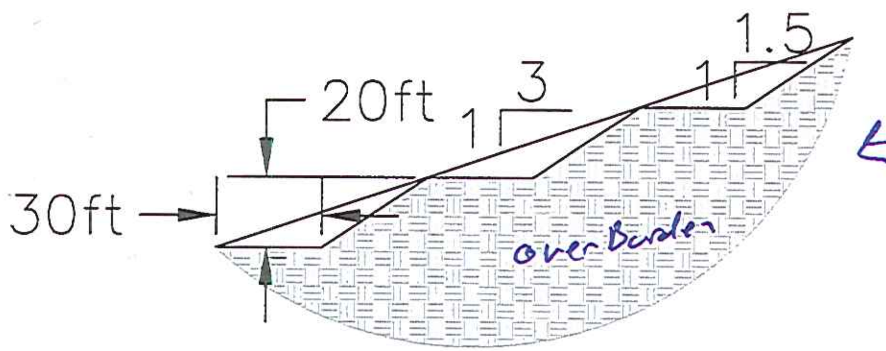


JOHNNY'S PAG



Johnnys PAG
Reclamation surface

10 ft Benches width
2.5:1 Bench slopes
3:1 overall slope
20 ft high Benches



Johnny's PAG
Stacking Layout

30 ft Benches width
20 ft high Benches
1.5:1 Bench slopes
3:1 overall slope

S:\CAD\1263B - Haile Final Design C3D\DELV\20130605-Johnny's Pag Stacked 1s 5s and break lines\Johnnys PAG Fully Stacked.dwg, 6/5/2013 5:49:37 PM

ATTACHMENT C

RUSLE 2 Model Input and Output

Table D-1 Johnny's PAG Monthly and Annual Soil Loss (Bare Land and no vegetation Management)

CALCULATION OF MONTHLY SOIL LOSS						
Johnny's PAG (3:1 Slope and terraces areas (33% slope) -Bare Land					Sorting by Month	
		Days per Period	Tons/ac/period	Tons/ac/month	Month	Tons/ac/month
2/15/2000	20	15	0.821917808		1	2.17
3/1/2000	27	14	1.035616438	3.15	2	1.93
3/15/2000	50	1	0.136986301		3	3.15
3/16/2000	45	16	1.97260274		4	2.22
4/1/2000	27	15	1.109589041	2.22	5	4.09
4/16/2000	27	15	1.109589041		6	6.49
5/1/2000	42	15	1.726027397	4.09	7	10.19
5/16/2000	54	16	2.367123288		8	7.27
6/1/2000	70	15	2.876712329	6.49	9	4.60
6/16/2000	88	15	3.616438356		10	3.13
7/1/2000	120	15	4.931506849	10.19	11	2.22
7/16/2000	120	16	5.260273973		12	1.83
8/1/2000	94	14	3.605479452	7.27		
8/15/2000	88	1	0.24109589			
8/16/2000	78	16	3.419178082			
9/1/2000	69	1	0.189041096	4.60		
9/2/2000	68	1	0.18630137			
9/3/2000	61	13	2.17260274			
9/16/2000	50	15	2.054794521			
10/1/2000	40	15	1.643835616	3.13		
10/16/2000	34	16	1.490410959			
11/1/2000	29	15	1.191780822	2.22		
11/16/2000	25	15	1.02739726			
12/1/2000	21	15	0.863013699	1.83		
12/16/2000	22	16	0.964383562			
1/1/2001	25	15	1.02739726	2.17		
1/16/2001	26	16	1.139726027			
2/1/2001	29	14	1.112328767	1.93		
2/15/2001						
				49.29	49.29 ton/ac/year	

USDA NRCS Natural Resources Conservation Service

RUSLE2 Expanded Profile Erosion Calculation Record

Info: **JOHNNY'S PAG – BARE LAND (NO OPERATION)**

File: profiles\Haile Gold Mine Lancaster Co SC.JOHNNYOVERBURDEN.BARELAND.33%

Inputs:
Location: South Carolina\USA\South Carolina\Lancaster County
Soil: Lancaster, SC\BnC Blanton sand, 6 to 15 percent slopes\Blanton sand 100%
Slope length (horiz): 50.0 ft
Avg. slope steepness: 33 %

Management	*Vegetation*	*Yield units*	*Yield (# of units)*

Contouring: default
Strips/barriers: default
Diversion/terrace, sediment basin: (none)
Subsurface drainage: (none)
Adjust res. burial level: Normal res. burial

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 59 t/ac/yr
Detachment on slope: 59 t/ac/yr
Soil loss for cons. plan: 59 t/ac/yr
Sediment delivery: 59 t/ac/yr

Crit. slope length: -- ft
Surf. cover after planting: -- %

Soil conditioning index (SCI): -4.5
Avg. annual slope STIR: 11
Wind & irrigation-induced erosion for SCI: 0 t/ac/yr

The SCI is the Soil Conditioning Index rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

The STIR value is the Soil Tillage Intensity Rating. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
2/15/0	Bulldozer, clearing/cutting		0
3/15/0	Bulldozer, filling/leveling		0
8/15/0	Disk, tandem light finishing		0
9/1/0	default		0
9/2/0	No operation		0
9/3/0	No operation		0
1/1/1	default		0

Period Start Date	*Operation*	*PLU*	*Avg. surf. cover, %*	*Avg. SC subfactor*	*Avg. CC subfactor*	*Avg. roughness, in.*	*Avg. SR subfactor*	*Avg. C factor*	*EI, %*
2/15/0	Bulldozer, clearing/cutting	0.45	0	1.0	1.0	0.28	0.97	0.44	2.3
3/1/0		0.45	0	1.0	1.0	0.28	0.97	0.44	3.0
3/15/0	Bulldozer, filling/leveling	1.0	0	1.0	1.0	0.24	1.00	1.00	0.23
3/16/0		1.00	0	1.0	1.0	0.24	1.00	1.00	3.3
4/1/0		1.00	0	1.0	1.0	0.24	1.00	1.00	2.7
4/16/0		1.00	0	1.0	1.0	0.24	1.00	0.99	2.6
5/1/0		0.99	0	1.0	1.0	0.24	1.00	0.99	3.9
5/16/0		0.99	0	1.0	1.0	0.24	1.00	0.99	5.1
6/1/0		0.99	0	1.0	1.0	0.24	1.00	0.98	5.9
6/16/0		0.98	0	1.0	1.0	0.24	1.00	0.98	7.0
7/1/0		0.98	0	1.0	1.0	0.24	1.00	0.98	8.9
7/16/0		0.98	0	1.0	1.0	0.24	1.00	0.97	9.3
8/1/0		0.97	0	1.0	1.0	0.24	1.00	0.97	7.0
8/15/0	Disk, tandem light finishing	1.0	0	1.0	1.0	0.26	0.98	0.98	0.47
8/16/0		1.00	0	1.0	1.0	0.26	0.98	0.98	7.0
9/1/0	default	1.00	0	1.0	1.0	0.26	0.99	0.98	0.40
9/2/0	No operation	1.00	0	1.0	1.0	0.26	0.99	0.98	0.39
9/3/0	No operation	1.00	0	1.0	1.0	0.26	0.99	0.99	4.6
9/16/0		1.00	0	1.0	1.0	0.25	0.99	0.98	4.6
10/1/0		0.99	0	1.0	1.0	0.25	0.99	0.98	3.8
10/16/0		0.99	0	1.0	1.0	0.25	0.99	0.98	3.4
11/1/0		0.99	0	1.0	1.0	0.25	0.99	0.98	2.6
11/16/0		0.98	0	1.0	1.0	0.25	0.99	0.98	2.3
12/1/0		0.98	0	1.0	1.0	0.25	0.99	0.97	1.7
12/16/0		0.98	0	1.0	1.0	0.24	0.99	0.97	1.9
1/1/1	Man #2: default	0.97	0	1.0	1.0	0.24	0.99	0.97	1.8
1/16/1		0.97	0	1.0	1.0	0.24	1.00	0.96	2.0
2/1/1		0.96	0	1.0	1.0	0.24	1.00	0.96	2.0

Period Start Date, m/d/y	*Operation Name*	*Man soil loss rate, t/ac/yr*	*Man sed del. rate*	*EI, %*
2/15/0	Bulldozer, clearing/cutting	20	20	2.3
3/1/0		27	27	3.0
3/15/0	Bulldozer, filling/leveling	50	50	0.23
3/16/0		45	45	3.3
4/1/0		27	27	2.7
4/16/0		27	27	2.6
5/1/0		42	42	3.9
5/16/0		54	54	5.1
6/1/0		70	70	5.9
6/16/0		88	88	7.0
7/1/0		120	120	8.9
7/16/0		120	120	9.3
8/1/0		94	94	7.0
8/15/0	Disk, tandem light finishing	88	88	0.47
8/16/0		78	78	7.0
9/1/0	default	69	69	0.40
9/2/0	No operation	68	68	0.39
9/3/0	No operation	61	61	4.6
9/16/0		50	50	4.6
10/1/0		40	40	3.8
10/16/0		34	34	3.4
11/1/0		29	29	2.6
11/16/0		25	25	2.3
12/1/0		21	21	1.7
12/16/0		22	22	1.9
1/1/1	Man #2: default	25	25	1.8
1/16/1		26	26	2.0
2/1/1		29	29	2.0

Table D-2 Johnny's PAG (Plateau Areas) Monthly and Annual Soil Loss (Hydroseeding and Vegetation Management)

CALCULATION OF MONTHLY SOIL LOSS						
Johnny's PAG (5% slope area Top of Overburden) - Hydroseeding					**Sorting by Month**	
		Days per F	Tons/ac/pe	Tons/ac/month	Month	Tons/ac/month
4/1/2000	0.58	14	0.022247	0.03	1	0.01
4/15/2000	1.1	1	0.003014		2	0.01
4/16/2000	0.56	1	0.001534		3	0.02
4/17/2000	0.17	14	0.006521		4	0.03
5/1/2000	0.36	15	0.014795	0.04	5	0.04
5/16/2000	0.62	16	0.027178		6	0.09
6/1/2000	0.94	15	0.03863	0.09	7	0.13
6/16/2000	1.2	15	0.049315		8	0.09
7/1/2000	1.5	15	0.061644	0.13	9	0.05
7/16/2000	1.5	16	0.065753		10	0.03
8/1/2000	1.2	15	0.049315	0.09	11	0.01
8/16/2000	0.93	16	0.040767		12	0.01
9/1/2000	0.68	15	0.027945	0.05		
9/16/2000	0.5	15	0.020548			
10/1/2000	0.36	15	0.014795	0.03		
10/16/2000	0.27	16	0.011836			
11/1/2000	0.2	15	0.008219	0.01		
11/16/2000	0.16	15	0.006575			
12/1/2000	0.13	15	0.005342	0.01		
12/16/2000	0.14	16	0.006137			
1/1/2001	0.17	15	0.006986	0.01		
1/16/2001	0.17	16	0.007452			
2/1/2001	0.17	14	0.006521	0.01		
2/15/2001	0.18	14	0.006904			
3/1/2001	0.24	15	0.009863	0.02		
3/16/2001	0.21	16	0.009205			
4/1/2001						
				0.53	0.53 ton/ac/year	

RUSLE2 Expanded Profile Erosion Calculation Record

Info: JOHNNY'S PAG TOP AREAS –GRASS COVERAGE

File: profiles\Haile Gold Mine Lancaster Co SC.JOHNNYOVERBYRDEN_TOP.HYDROSEEDING.5%

Inputs:
Location: South Carolina\USA\South Carolina\Lancaster County
Soil: Lancaster, SC\BnC Blanton sand, 6 to 15 percent slopes\Blanton sand 100%
Slope length (horiz): 100 ft
Avg. slope steepness: 5.0 %

Management	*Vegetation*	*Yield units*	*Yield (# of units)*
CMZ 37\CMZ 37\d.Construction Site Templates\Hydro seeding	Turfgrass, spring seed	tons	1.50
Strip/Barrier Managements\Bahiagrass; not harvested	Permanent cover not harvested\Bahiagrass, not harvested	lb	8000

Contouring: a. rows up-and-down hill
Strips/barriers: Width as pct of slope length\1-Bahiagrass buffer midslope 10 pct. of slope length
Diversion/terrace, sediment basin: (none)
Subsurface drainage: (none)
Adjust res. burial level: Normal res. burial

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.65 t/ac/yr
Detachment on slope: 0.65 t/ac/yr
Soil loss for cons. plan: 0.59 t/ac/yr
Sediment delivery: 0.56 t/ac/yr

Crit. slope length: -- ft
Surf. cover after planting: 35 %

Soil conditioning index (SCI): 0.22
Avg. annual slope STIR: 73
Wind & irrigation-induced erosion for SCI: 0 t/ac/yr

The SCI is the Soil Conditioning Index rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

The STIR value is the Soil Tillage Intensity Rating. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/1/0	Disk, tandem secondary op.		36
4/15/0	Disk, tandem secondary op.		16
4/16/0	Harrow, spike tooth		35
4/16/0	Hydro-seeder	Turfgrass, spring seed	35
4/17/0	Add mulch		93
1/1/1	begin growth	Permanent cover not harvested\Bahiagrass, not harvested	0
4/1/0	Disk, tandem secondary op.		36
4/15/0	Disk, tandem secondary op.		16
4/16/0	Harrow, spike tooth		35
4/16/0	Hydro-seeder	Turfgrass, spring seed	35
4/17/0	Add mulch		93

Period Start Date	*Operation*	*PLU*	*Avg. surf. cover, %*	*Avg. SC subfactor*	*Avg. CC subfactor*	*Avg. roughness, in.*	*Avg. SR subfactor*	*Avg. C factor*	*EI, %*
4/1/0	Disk, tandem secondary op.	0.24	35	0.34	0.88	0.34	0.93	0.066	2.5
4/15/0	Disk, tandem secondary op.	0.25	16	0.60	0.96	0.34	0.93	0.14	0.16
4/16/0	Harrow, spike tooth								0
4/16/0	Hydro-seeder => Turfgrass, spring seed	0.25	35	0.34	0.98	0.30	0.96	0.081	0.16
4/17/0	Add mulch	0.30	90	0.075	1.00	0.30	0.96	0.021	2.5
5/1/0		0.38	85	0.083	0.98	0.29	0.96	0.030	3.9
5/16/0		0.48	76	0.094	0.93	0.28	0.97	0.041	5.1
6/1/0		0.56	66	0.10	0.86	0.28	0.97	0.049	5.9
6/16/0		0.62	56	0.11	0.71	0.27	0.98	0.049	7.0
7/1/0		0.67	46	0.13	0.57	0.27	0.98	0.047	8.9
7/16/0		0.69	38	0.14	0.51	0.26	0.98	0.049	9.3
8/1/0		0.69	32	0.15	0.46	0.26	0.99	0.048	7.5
8/16/0		0.67	27	0.17	0.42	0.25	0.99	0.046	7.0
9/1/0		0.64	24	0.17	0.40	0.25	0.99	0.043	5.4
9/16/0		0.58	22	0.18	0.38	0.25	0.99	0.039	4.6
10/1/0		0.52	20	0.18	0.37	0.25	0.99	0.034	3.8
10/16/0		0.46	19	0.18	0.36	0.25	0.99	0.030	3.4
11/1/0		0.41	18	0.18	0.35	0.25	0.99	0.026	2.6
11/16/0		0.36	23	0.16	0.42	0.25	0.99	0.024	2.3
12/1/0		0.32	29	0.14	0.50	0.25	0.99	0.022	1.7
12/16/0		0.32	31	0.14	0.55	0.24	0.99	0.024	1.9
1/1/1	Bahiagrass, not harvested	0.33	30	0.14	0.55	0.24	0.99	0.025	1.8
1/16/1		0.32	29	0.14	0.51	0.24	1.00	0.023	2.0
2/1/1		0.30	28	0.15	0.47	0.24	1.00	0.021	2.0
2/15/1		0.29	26	0.16	0.42	0.24	1.00	0.020	2.3
3/1/1		0.28	24	0.17	0.40	0.24	1.00	0.019	3.2
3/16/1		0.26	22	0.17	0.39	0.24	1.00	0.018	3.3

Period Start Date, m/d/y	*Operation Name*	*Man soil loss rate, t/ac/yr*	*Man sed del. rate*	*EI, %*
4/1/0	Disk, tandem secondary op.	0.58	0.58	2.5
4/15/0	Disk, tandem secondary op.	1.1	1.1	0.16
4/16/0	Harrow, spike tooth			0
4/16/0	Hydro-seeder => Turfgrass, spring seed	0.56	0.56	0.16
4/17/0	Add mulch	0.17	0.17	2.5
5/1/0		0.36	0.36	3.9
5/16/0		0.62	0.62	5.1
6/1/0		0.94	0.94	5.9
6/16/0		1.2	1.2	7.0
7/1/0		1.5	1.5	8.9
7/16/0		1.5	1.5	9.3
8/1/0		1.2	1.2	7.5
8/16/0		0.93	0.93	7.0
9/1/0		0.68	0.68	5.4
9/16/0		0.50	0.50	4.6
10/1/0		0.36	0.36	3.8
10/16/0		0.27	0.27	3.4
11/1/0		0.20	0.20	2.6
11/16/0		0.16	0.16	2.3
12/1/0		0.13	0.13	1.7
12/16/0		0.14	0.14	1.9
1/1/1	Bahiagrass, not harvested	0.17	0.17	1.8
1/16/1		0.17	0.17	2.0
2/1/1		0.17	0.17	2.0
2/15/1		0.18	0.18	2.3
3/1/1		0.24	0.24	3.2
3/16/1		0.21	0.21	3.3

Table D-3 Johnny's PAG (33% Slope) Monthly and Annual Soil Loss (Hydroseeding and Vegetation Management)

CALCULATION OF MONTHLY SOIL LOSS						
Johnny's PAG (3:1 Slope and terraces areas (33% slope) -Hydroseeding					Sorting by Month	
		Days per F	Tons/ac/period	Tons/ac/month	Month	Tons/ac/month
4/1/2000	2.5	14	0.095890411	0.15	1	0.06
4/15/2000	4.8	1	0.013150685		2	0.06
4/16/2000	2.8	1	0.007671233		3	0.08
4/17/2000	0.84	14	0.032219178		4	0.15
5/1/2000	1.7	15	0.069863014	0.20	5	0.20
5/16/2000	2.9	16	0.127123288		6	0.38
6/1/2000	4.2	15	0.17260274	0.38	7	0.52
6/16/2000	5	15	0.205479452		8	0.36
7/1/2000	6.3	15	0.25890411	0.52	9	0.20
7/16/2000	6	16	0.263013699		10	0.11
8/1/2000	4.8	15	0.197260274	0.36	11	0.06
8/16/2000	3.8	16	0.166575342		12	0.05
9/1/2000	2.8	15	0.115068493	0.20		
9/16/2000	2	15	0.082191781			
10/1/2000	1.5	15	0.061643836	0.11		
10/16/2000	1.1	16	0.048219178			
11/1/2000	0.85	15	0.034931507	0.06		
11/16/2000	0.67	15	0.027534247			
12/1/2000	0.53	15	0.021780822	0.05		
12/16/2000	0.61	16	0.026739726			
1/1/2001	0.73	15	0.03	0.06		
1/16/2001	0.71	16	0.031123288			
2/1/2001	0.72	14	0.027616438	0.06		
2/15/2001	0.79	14	0.03030137			
3/1/2001	1	15	0.04109589	0.08		
3/16/2001	0.93	16	0.040767123			
4/1/2001						
				2.23	2.23	ton/ac/year

RUSLE2 Expanded Profile Erosion Calculation Record

Info: **JOHNNY'S PAG – HYDROSEEDING – GRASS COVERAGE**

File: profiles\Haile Gold Mine Lancaster Co SC.JOHNNYOVERBYRDEN.HYDROSEEDING.33%

Inputs:
Location: South Carolina\USA\South Carolina\Lancaster County
Soil: Lancaster, SC\BnC Blanton sand, 6 to 15 percent slopes\Blanton sand 100%
Slope length (horiz): 50.0 ft
Avg. slope steepness: 33 %

Management	*Vegetation*	*Yield units*	*Yield (# of units)*
CMZ 37\CMZ 37\d.Construction Site Templates\Hydro seeding	Turfgrass, spring seed	tons	1.50
Strip/Barrier Managements\Bahiagrass; not harvested	Permanent cover not harvested\Bahiagrass, not harvested	lb	8000

Contouring: a. rows up-and-down hill
Strips/barriers: Width as pct of slope length\1-Bahiagrass buffer midslope 10 pct. of slope length
Diversion/terrace, sediment basin: 1 Diversion 2.0% grade in middle of RUSLE slope
Subsurface drainage: (none)
Adjust res. burial level: Normal res. burial

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 2.3 t/ac/yr
Detachment on slope: 2.3 t/ac/yr
Soil loss for cons. plan: 2.3 t/ac/yr
Sediment delivery: 2.0 t/ac/yr

Crit. slope length: -- ft
Surf. cover after planting: 35 %

Soil conditioning index (SCI): 0.093
Avg. annual slope STIR: 73
Wind & irrigation-induced erosion for SCI: 0 t/ac/yr

The SCI is the Soil Conditioning Index rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

The STIR value is the Soil Tillage Intensity Rating. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/1/0	Disk, tandem secondary op.		36
4/15/0	Disk, tandem secondary op.		16
4/16/0	Harrow, spike tooth		35
4/16/0	Hydro-seeder	Turfgrass, spring seed	35
4/17/0	Add mulch		93
1/1/1	begin growth	Permanent cover not harvested\Bahiagrass, not harvested	0
4/1/0	Disk, tandem secondary op.		36
4/15/0	Disk, tandem secondary op.		16
4/16/0	Harrow, spike tooth		35
4/16/0	Hydro-seeder	Turfgrass, spring seed	35
4/17/0	Add mulch		93

Period Start Date	*Operation*	*PLU*	*Avg. surf. cover, %*	*Avg. SC subfactor*	*Avg. CC subfactor*	*Avg. roughness, in.*	*Avg. SR subfactor*	*Avg. C factor*	*EI, %*
4/1/0	Disk, tandem secondary op.	0.24	35	0.27	0.88	0.34	0.93	0.054	2.5
4/15/0	Disk, tandem secondary op.	0.25	16	0.54	0.96	0.34	0.93	0.12	0.16
4/16/0	Harrow, spike tooth								0
4/16/0	Hydro-seeder => Turfgrass, spring seed	0.25	35	0.29	0.98	0.30	0.96	0.069	0.16
4/17/0	Add mulch	0.30	90	0.055	1.00	0.30	0.96	0.016	2.5
5/1/0		0.38	85	0.062	0.98	0.29	0.96	0.023	3.9
5/16/0		0.48	76	0.072	0.93	0.28	0.97	0.031	5.1
6/1/0		0.56	66	0.080	0.86	0.28	0.97	0.038	5.9
6/16/0		0.62	56	0.087	0.71	0.27	0.98	0.038	7.0
7/1/0		0.67	46	0.098	0.57	0.27	0.98	0.036	8.9
7/16/0		0.69	38	0.11	0.51	0.26	0.98	0.038	9.3
8/1/0		0.69	32	0.12	0.46	0.26	0.99	0.037	7.5
8/16/0		0.67	27	0.13	0.42	0.25	0.99	0.036	7.0
9/1/0		0.64	24	0.13	0.40	0.25	0.99	0.033	5.4
9/16/0		0.58	22	0.13	0.38	0.25	0.99	0.029	4.6
10/1/0		0.52	20	0.14	0.37	0.25	0.99	0.025	3.8
10/16/0		0.46	19	0.14	0.36	0.25	0.99	0.022	3.4
11/1/0		0.41	18	0.14	0.35	0.25	0.99	0.019	2.6
11/16/0		0.36	23	0.11	0.42	0.25	0.99	0.017	2.3
12/1/0		0.32	29	0.100	0.50	0.25	0.99	0.016	1.7
12/16/0		0.32	31	0.096	0.55	0.24	0.99	0.017	1.9
1/1/1	Bahiagrass, not harvested	0.33	30	0.098	0.55	0.24	0.99	0.018	1.8
1/16/1		0.32	29	0.10	0.51	0.24	1.00	0.016	2.0
2/1/1		0.30	28	0.10	0.47	0.24	1.00	0.015	2.0
2/15/1		0.29	26	0.11	0.42	0.24	1.00	0.014	2.3
3/1/1		0.28	24	0.12	0.40	0.24	1.00	0.014	3.2
3/16/1		0.26	22	0.13	0.39	0.24	1.00	0.013	3.3

Period Start Date, m/d/y	*Operation Name*	*Man soil loss rate, t/ac/yr*	*Man sed del. rate*	*EI, %*
4/1/0	Disk, tandem secondary op.	2.5	2.5	2.5
4/15/0	Disk, tandem secondary op.	4.8	4.8	0.16
4/16/0	Harrow, spike tooth			0
4/16/0	Hydro-seeder => Turfgrass, spring seed	2.8	2.8	0.16
4/17/0	Add mulch	0.84	0.84	2.5
5/1/0		1.7	1.7	3.9
5/16/0		2.9	2.9	5.1
6/1/0		4.2	4.2	5.9
6/16/0		5.0	5.0	7.0
7/1/0		6.3	6.3	8.9
7/16/0		6.0	6.0	9.3
8/1/0		4.8	4.8	7.5
8/16/0		3.8	3.8	7.0
9/1/0		2.8	2.8	5.4
9/16/0		2.0	2.0	4.6
10/1/0		1.5	1.5	3.8
10/16/0		1.1	1.1	3.4
11/1/0		0.85	0.85	2.6
11/16/0		0.67	0.67	2.3
12/1/0		0.53	0.53	1.7
12/16/0		0.61	0.61	1.9
1/1/1	Bahiagrass, not harvested	0.73	0.73	1.8
1/16/1		0.71	0.71	2.0
2/1/1		0.72	0.72	2.0
2/15/1		0.79	0.79	2.3
3/1/1		1.0	1.0	3.2
3/16/1		0.93	0.93	3.3

Table D-4 Tailing Storage FacilityMonthly and Annual Soil Loss (Hydroseeding and Vegetation Management)

CALCULATION OF MONTHLY SOIL LOSS						
Tailing Storage Facility (0.5%)					Sorting by Month	
		Days per P	Tons/ac/pe	Tons/ac/month	Month	Tons/ac/month
4/1/2000	0.083	14	0.003184	0.005	1	0.0030
4/15/2000	0.15	1	0.000411		2	0.0030
4/16/2000	0.091	1	0.000249		3	0.0044
4/17/2000	0.031	14	0.001189		4	0.0050
5/1/2000	0.061	15	0.002507	0.007	5	0.0068
5/16/2000	0.099	16	0.00434		6	0.0148
6/1/2000	0.15	15	0.006164	0.015	7	0.0255
6/16/2000	0.21	15	0.00863		8	0.0195
7/1/2000	0.3	15	0.012329	0.025	9	0.0115
7/16/2000	0.3	16	0.013151		10	0.0063
8/1/2000	0.25	15	0.010274	0.019	11	0.0035
8/16/2000	0.21	16	0.009205		12	0.0024
9/1/2000	0.16	15	0.006575	0.012		
9/16/2000	0.12	15	0.004932			
10/1/2000	0.085	15	0.003493	0.006		
10/16/2000	0.065	16	0.002849			
11/1/2000	0.048	15	0.001973	0.003		
11/16/2000	0.037	15	0.001521			
12/1/2000	0.027	15	0.00111	0.002		
12/16/2000	0.029	16	0.001271			
1/1/2001	0.035	15	0.001438	0.003		
1/16/2001	0.035	16	0.001534			
2/1/2001	0.037	14	0.001419	0.003		
2/15/2001	0.041	14	0.001573			
3/1/2001	0.054	15	0.002219	0.004		
3/16/2001	0.049	16	0.002148			
4/1/2001						
				0.106	0.106 ton/ac/year	

RUSLE2 Expanded Profile Erosion Calculation Record

Info: **TAILING STORAGE FACILITY**

File: profiles\Haile Gold Mine Lancaster Co SC.TSF.DUCKWOOD

Inputs:
Location: South Carolina\USA\South Carolina\Lancaster County
Soil: Lancaster, SC\BnC Blanton sand, 6 to 15 percent slopes\Blanton sand 100%
Slope length (horiz): 1000 ft
Avg. slope steepness: 0.50 %

Management	*Vegetation*	*Yield units*	*Yield (# of units)*
CMZ 37\CMZ 37\d.Construction Site Templates\Hydro seeding	Turfgrass, spring seed	tons	1.50
Strip/Barrier Managements\Bahiagrass; not harvested	Permanent cover not harvested\Bahiagrass, not harvested	lb	8000

Contouring: a. rows up-and-down hill
Strips/barriers: Width as pct of slope length\1-Bahiagrass buffer midslope 10 pct. of slope length
Diversion/terrace, sediment basin: 1 Diversion 0.5% grade at bottom of RUSLE slope
Subsurface drainage: (none)
Adjust res. burial level: Normal res. burial

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.10 t/ac/yr
Detachment on slope: 0.10 t/ac/yr
Soil loss for cons. plan: 0.095 t/ac/yr
Sediment delivery: 0.091 t/ac/yr

Crit. slope length: -- ft
Surf. cover after planting: 39 %

Soil conditioning index (SCI): 0.38
Avg. annual slope STIR: 73
Wind & irrigation-induced erosion for SCI: 0 t/ac/yr

The SCI is the Soil Conditioning Index rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

The STIR value is the Soil Tillage Intensity Rating. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/1/0	Disk, tandem secondary op.		47
4/15/0	Disk, tandem secondary op.		23
4/16/0	Harrow, spike tooth		39
4/16/0	Hydro-seeder	Turfgrass, spring seed	39
4/17/0	Add mulch		94
1/1/1	begin growth	Permanent cover not harvested\Bahiagrass, not harvested	0
4/1/0	Disk, tandem secondary op.		47
4/15/0	Disk, tandem secondary op.		23
4/16/0	Harrow, spike tooth		39
4/16/0	Hydro-seeder	Turfgrass, spring seed	39
4/17/0	Add mulch		94

Period Start Date	*Operation*	*PLU*	*Avg. surf. cover, %*	*Avg. SC subfactor*	*Avg. CC subfactor*	*Avg. roughness, in.*	*Avg. SR subfactor*	*Avg. C factor*	*EI, %*
4/1/0	Disk, tandem secondary op.	0.21	46	0.31	0.90	0.34	0.93	0.056	2.5
4/15/0	Disk, tandem secondary op.	0.22	23	0.56	0.96	0.35	0.93	0.11	0.16
4/16/0	Harrow, spike tooth								0
4/16/0	Hydro-seeder => Turfgrass, spring seed	0.22	39	0.36	0.98	0.30	0.96	0.076	0.16
4/17/0	Add mulch	0.26	94	0.094	1.00	0.30	0.96	0.023	2.5
5/1/0		0.34	92	0.095	0.99	0.29	0.96	0.031	3.9
5/16/0		0.43	91	0.095	0.97	0.29	0.97	0.038	5.1
6/1/0		0.50	88	0.096	0.95	0.28	0.97	0.045	5.9
6/16/0		0.56	86	0.097	0.91	0.27	0.98	0.048	7.0
7/1/0		0.61	83	0.100	0.86	0.27	0.98	0.052	8.9
7/16/0		0.63	79	0.10	0.84	0.26	0.98	0.054	9.3
8/1/0		0.64	76	0.11	0.81	0.26	0.99	0.056	7.5
8/16/0		0.63	72	0.11	0.78	0.26	0.99	0.056	7.0
9/1/0		0.60	69	0.12	0.76	0.25	0.99	0.053	5.4
9/16/0		0.55	66	0.12	0.73	0.25	0.99	0.049	4.6
10/1/0		0.49	64	0.13	0.71	0.25	0.99	0.044	3.8
10/16/0		0.44	61	0.13	0.69	0.25	0.99	0.040	3.4
11/1/0		0.39	59	0.14	0.68	0.25	0.99	0.035	2.6
11/16/0		0.34	61	0.13	0.70	0.25	0.99	0.031	2.3
12/1/0		0.30	63	0.12	0.74	0.25	0.99	0.027	1.7
12/16/0		0.30	63	0.12	0.76	0.25	0.99	0.028	1.9
1/1/1	Bahiagrass, not harvested	0.31	62	0.12	0.76	0.24	0.99	0.029	1.8
1/16/1		0.31	61	0.13	0.73	0.24	0.99	0.028	2.0
2/1/1		0.29	60	0.13	0.70	0.24	1.00	0.026	2.0
2/15/1		0.28	58	0.14	0.67	0.24	1.00	0.026	2.3
3/1/1		0.27	56	0.14	0.65	0.24	1.00	0.025	3.2
3/16/1		0.26	54	0.15	0.63	0.24	1.00	0.024	3.3

Period Start Date, m/d/y	*Operation Name*	*Man soil loss rate, t/ac/yr*	*Man sed del. rate*	*EI, %*
4/1/0	Disk, tandem secondary op.	0.083	0.083	2.5
4/15/0	Disk, tandem secondary op.	0.15	0.15	0.16
4/16/0	Harrow, spike tooth			0
4/16/0	Hydro-seeder => Turfgrass, spring seed	0.091	0.091	0.16
4/17/0	Add mulch	0.031	0.031	2.5
5/1/0		0.061	0.061	3.9
5/16/0		0.099	0.099	5.1
6/1/0		0.15	0.15	5.9
6/16/0		0.21	0.21	7.0
7/1/0		0.30	0.30	8.9
7/16/0		0.30	0.30	9.3
8/1/0		0.25	0.25	7.5
8/16/0		0.21	0.21	7.0
9/1/0		0.16	0.16	5.4
9/16/0		0.12	0.12	4.6
10/1/0		0.085	0.085	3.8
10/16/0		0.065	0.065	3.4
11/1/0		0.048	0.048	2.6
11/16/0		0.037	0.037	2.3
12/1/0		0.027	0.027	1.7
12/16/0		0.029	0.029	1.9
1/1/1	Bahiagrass, not harvested	0.035	0.035	1.8
1/16/1		0.035	0.035	2.0
2/1/1		0.037	0.037	2.0
2/15/1		0.041	0.041	2.3
3/1/1		0.054	0.054	3.2
3/16/1		0.049	0.049	3.3

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APPENDIX B

Revegetation Plan & Seed Mixes

Re-establishing vegetation on impacted lands will be essential to preventing erosion, restoring surface stability, providing site productivity, and providing wildlife forage/cover opportunities as well as visual/aesthetic values at the Haile Gold Mine Project Site during operations and reclamation. The vegetation procedures planned for the Haile Site are based on industry standards, Site specific experience in South Carolina, and past reclamation success.

Two seed mixes are proposed to be used at Haile. One is a standard seed mix and the second is a wetland seed mix. Haile is not currently proposing any "other plantings." All seed shall be certified noxious weed-free. The standard seed mix was chosen based on species characteristics, varied soil conditions at Site, and the planned land use and maintenance of the area. An annual grass is used in the mix and will change dependent on the time of year the planting is made. The primary goal of revegetation is soil stabilization while a secondary goal is to provide a habitat for wildlife and the natural succession of vegetation.

Standard Seed Mix

The standard seed mix has been developed to be broadcast seeded or hydroseeded at 75-100 pounds per acre. The seeding rate has been developed based on the recommended rates from the seed distributor. This seeding rate is considered appropriate for anticipated Site conditions, seasonal seeding variability, anticipated application methods and the need for rapid erosion control. The recommended seeding rate may be adjusted (either higher or lower) based upon Site-specific testing and evaluation of successful germination.

The individual plant species selected are generally known to establish quickly in South Carolina and germinate over a wide time period during the year and are commercially available. As a mix, the plant species selected for permanent cover are intended to complement each other in long-term establishment while ultimately developing a diverse native community. The seed mixes are from data and information gathered from consultants in South Carolina and are intended to aid erosion control and establishment of a grassland community. A forest community is not proposed or considered appropriate as the initial reclamation community due to long-establishment period, limited initial erosion control protection, and limited wildlife habitat diversity. A forest community will, however, evolve over time.

The Standard Seed Mix is proposed to be used year-round on all areas to be reseeded at the Haile Site except where the wetland seed mix is specified (see below). These areas are shown on the reclamation maps. However, optimal planting time for the long-term species is approximately October 15 through May 31. Seeding that occurs outside of the optimal planting window may potentially result in lower or slower germination rates. To promote vegetation success and minimize erosion during reseeding, two different annual grasses are used: Browntop millet (summer, April thru September) and Rye Grain (winter, September thru April). Browntop millet is a warm season annual grass that can be planted during spring and summer months. This species germinates quickly, provides dense ground cover and produces abundant biomass and seed. Rye Grain is a cool season annual grass that can be planted fall through spring providing a rapid winter cover.

Standard Seed Mix*

Common Name	Scientific Name	Approximate Percent of Mix
Purple Top	*Tridens flava*	20%
Partidge Pea	*Chamaecrista fasciculata*	10%
Shyleaf Vetch	*Aeschynomene Americana L.*	15%
Showy Ticktrefoil	*Desmodium canadense*	3%
Switchgrass	*Panicum virgatum*	20%
Indiangrass	*Sorghastrum nutans*	10%
White Clover	*Trifolium repens*	10%
Rye Grain[1] / Browntop Millet[2]	*Secale cereale/ Erograstiscurvula*	10%
Oxeye Sunflower	*Heliopsis helianthoides*	2%

*Spread at 30 - 40 pounds per acre
*The seeds and mix in the table may vary based upon ecotype, availability, and success of a variety of seed.
[1]Cool season mix
[2]Warm season mix

Wetland Seed Mix

The Wetland Seed Mix has been developed to be broadcast seeded or hydroseeded at 20-25 pounds per acre. The Wetland Seed Mix includes species adapted to soil conditions ranging from mesic to hydric in areas that are considered wetlands and/or riparian on Site. The wetland and riparian areas on Site are generally considered as having seasonally saturated soils. This will include areas immediately around permitted culvert installations and stream restoration work. Prolonged inundation is not typical of the wetlands and riparian areas characteristic of the Site. Species in the Wetland Seed Mix will prevent soil erosion, provide long-term vegetative cover, and provide general wildlife habitat. The Wetland Seed Mix will result in a community of palustrine emergent wetland vegetation that will likely transition in to the more typical characteristic forested wetland community through natural successional processes.

Wetland Seed Mix*

Common Name	**Scientific Name**	**Approximate Percent of Mix**
Riverbank wild rye	*Elymus riparius*	25%
Fox sedge	*Carex vulpinoidea*	17%
Switchgrass	*Panicum virgatum*	15%
Fowl bluegrass	*Poa palustris*	20%
Deer tongue	*Dichanthelium clandestinum*	8%
Bidens	*Bidens aristosa*	7%
Soft rush	*Juncus effusus*	4%
Duck potato	*Sagittaria latifolia*	2%
Lizards tail	*Saururus cernuus*	2%

*Spread at 20-25 pounds per acre

* The seeds and mix in the table may vary based upon ecotype, availability, and success of a variety of seed.

Appendix C

TABLE 1
Romarco Minerals - Haile Gold Mine
Reclamation and Closure Cost Estimates
Summary of Bonding and Reclamation Costs

	Bond (thousand $)		
Year	Required Assurance	Release	Cumulative Outstanding
PP	21,574	-	21,574
YR 1	476	-	22,050
YR 2	4,689	(6,207)	20,532
YR 3	3,244	-	23,776
YR 4	2,673	-	26,449
YR 5	-	-	26,449
YR 6	93	(488)	26,054
YR 7	1,008	(325)	26,738
YR 8	833	(479)	27,093
YR 9	-	(547)	26,546
YR 10	174	(1,334)	25,386
YR 11	-	(1,407)	23,980
YR 12	-	(279)	23,701
YR 13	-	-	23,701
YR 14	-	-	23,701
YR 15	-	(474)	23,227
YR 16	-	(308)	22,919
YR 17	-	(340)	22,579
YR 18	-	(194)	22,385
YR 19	-	(34)	22,352
YR 20	-	(1,074)	21,278
YR 21	-	(34)	21,244
YR 22	-	(34)	21,210
YR 23	-	(34)	21,177
YR 24	-	(34)	21,143
YR 25	-	(13,065)	8,078
YR 26	-	(34)	8,045
YR 27	-	(34)	8,011
YR 28	-	(34)	7,977
YR 29	-	(34)	7,944
YR 30	-	(34)	7,910
YR 31	-	(34)	7,876
YR 32	-	(34)	7,843
YR 33	-	(3,378)	4,465
YR 34	-	(34)	4,431
YR 35	-	(34)	4,398
YR 36	-	(40)	4,358
YR 37	-	(34)	4,324
YR 38	-	(34)	4,290
YR 39	-	(34)	4,257
YR 40	-	(256)	4,001
YR 41	-	(34)	3,967
YR 42	-	(34)	3,933
YR 43	-	(945)	2,988
YR 44	-	(34)	2,954
YR 45	-	(34)	2,921
YR 46	-	(2,310)	611
YR 47	-	(34)	578
YR 48	-	(34)	544
YR 49	-	(34)	510
YR 50	-	(34)	477
YR 51	-	(34)	443
YR 52	-	(34)	409
YR 53	-	(34)	376
YR 54	-	(34)	342
YR 55	-	(34)	308
YR 56	-	(34)	275
YR 57	-	(34)	241
YR 58	-	(34)	207
YR 59	-	(34)	174
YR 60	-	(34)	140
YR 61	-	(34)	106
YR 62	-	(34)	73
YR 63+	-	(73)	(0)
Total	34,765	(34,765)	

TABLE 2
Romarco Minerals - Haile Gold Mine
Reclamation and Closure Cost Estimates
Bond Assurance Amount Summary Table

Bond Assurance Annual Breakdown (thousand $)

Facility	Bond Assurance (thousand $)		Year Operations Begin	PP	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6	YR 7	YR 8	YR 9	YR 10	YR 11	YR 12
Bond Amount Less Indirects	**32,797**			20,353	449	4,424	3,060	2,521	-	88	951	786	-	165	-	-
Indirect Costs	**1,968**			1,221	27	265	184	151	-	5	57	47	-	10	-	-
Total Bond Amount	**34,765**			21,574	476	4,689	3,244	2,673	-	93	1,008	833	-	174	-	-
				-												
Open Pits Subtotal		**11,971**		-												
Mill Zone Pit	190		PP	190	-	-	-	-	-	-	-	-	-	-	-	-
Haile Pit	162		3	-	-	162	-	-	-	-	-	-	-	-	-	-
Red Hill Pit	145		4	-	-	-	145	-	-	-	-	-	-	-	-	-
Ledbetter Pit	2,926		4	-	-	-	2,926	-	-	-	-	-	-	-	-	-
Snake Pit	145		1	145	-	-	-	-	-	-	-	-	-	-	-	-
Chase Pit	93		7	-	-	-	-	-	-	93	-	-	-	-	-	-
Champion Pit	833		9	-	-	-	-	-	-	-	-	833	-	-	-	-
Small Pit	174		11	-	-	-	-	-	-	-	-	-	-	174	-	-
Johnny's PAG	7,302				-	-	-	-	-	-	-	-	-	-	-	-
Overburden Areas Subtotal		**2,345**	Multiple Phases	4,527	-	2,775	-	-	-	-	-	-	-	-	-	-
601 OSA	150		PP	150	-	-	-	-	-	-	-	-	-	-	-	-
Ramona OSA	762		PP	762	-	-	-	-	-	-	-	-	-	-	-	-
Hayworth OSA	423		3	-	-	423	-	-	-	-	-	-	-	-	-	-
Hilltop OSA	306		3	-	-	306	-	-	-	-	-	-	-	-	-	-
James OSA	325		2	-	325	-	-	-	-	-	-	-	-	-	-	-
Robert OSA	379		1	379	-	-	-	-	-	-	-	-	-	-	-	-
Site Surface Water Management Subtotal		**1,094**														
Stormwater and contact water controls	110		PP	110	-	-	-	-	-	-	-	-	-	-	-	-
Re-establish Drainages	984		PP	984	-	-	-	-	-	-	-	-	-	-	-	-
TSF Subtotal		**15,279**														
TSF Impoundment	15,173		Multiple Phases	12,138	-	1,017	-	1,017	-	-	1,001	-	-	-	-	-
TSF Outlet Notch	98		Multiple Phases	78	-	7	-	7	-	-	6	-	-	-	-	-
TSF Downchute	8		Multiple Phases	7	-	1	-	1	-	-	1	-	-	-	-	-
Mill Site and Associated Infrastructure Subtotal		**1,196**														
Dismantle Plant and Mill and Water Treatment Plant	732		PP	732	-	-	-	-	-	-	-	-	-	-	-	-
Reclaim Mill Site	223		PP	223	-	-	-	-	-	-	-	-	-	-	-	-
Service/Construction Roads	241		PP	241	-	-	-	-	-	-	-	-	-	-	-	-
Roads, Powerlines and Other Facilities Subtotal		**1,231**														
Remove Haul Roads	229		PP	229	-	-	-	-	-	-	-	-	-	-	-	-
Powerlines	202		PP	202	-	-	-	-	-	-	-	-	-	-	-	-
Pipelines	132		PP	132	-	-	-	-	-	-	-	-	-	-	-	-
Growth Media Stockpiles and Borrow Areas	188		PP	188	-	-	-	-	-	-	-	-	-	-	-	-
Revegetate Holly Borrow Areas	109		2	-	109	-	-	-	-	-	-	-	-	-	-	-
Revegetate Hock Borrow Areas	172		4	-	-	-	172	-	-	-	-	-	-	-	-	-
HGMC Detention and Diversion Structure	42		2	-	42	-	-	-	-	-	-	-	-	-	-	-
Well Abandonment	157		PP	157	-	-	-	-	-	-	-	-	-	-	-	-
Post-Closure Subtotal		**1,649**														
Mine Site Post-closure maintenance and monitoring	903		5	-	-	-	-	903	-	-	-	-	-	-	-	-
TSF Site Post-closure maintenance and monitoring	746		5	-	-	-	-	746	-	-	-	-	-	-	-	-

TABLE 3
Romarco Minerals - Haile Gold Mine
Reclamation and Closure Cost Estimates
Bond Release Annual Summary Table

Bond Release Annual Breakdown (thousand $)

Facility	Bonded Reclamation Costs (thousand $)		Year of Earthworks Complete	Year of Revegetation Complete	Year of Earthworks Release	Year of Final Bond Release	PP	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6	YR 7	YR 8	YR 9	YR 10	YR 11	YR 12	YR 13	YR 14	YR 15	YR 16	YR 17	YR 18	YR 19	YR 20	YR 21	YR 22	YR 23	YR 24	YR 25	YR 26	YR 27	YR 28	YR 29	YR 30	YR 31
Bond Releases Less Indirects	**32,797**							-	5,856	-	-	-	460	306	451	516	1,259	1,327	263	-	-	447	290	321	183	32	1,013	32	32	32	32	12,325	32	32	32	32	32	32
Indirect Costs	**1,968**							-	351	-	-	-	28	18	27	31	76	80	16	-	-	27	17	19	11	2	61	2	2	2	2	740	2	2	2	2	2	2
Total Bond Releases	**34,765**							-	6,207	-	-	-	488	325	479	547	1,334	1,407	279	-	-	474	308	340	194	34	1,074	34	34	34	34	13,065	34	34	34	34	34	34
Open Pits Subtotal		**11,971**																																				
Mill Zone Pit	190		7	8	11	11		-	-	-	-	-	-	-	-	-	-	190	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Haile Pit	162		8	9	12	12		-	-	-	-	-	-	-	-	-	-	-	162	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Red Hill Pit	145		12	13	16	16		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	145	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Ledbetter Pit	2,926		13	13	33	43		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Snake Pit	145		6	6	9	43		-	-	-	-	-	-	-	-	124	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Chase Pit	93		12	12	16	16		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	93	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Champion Pit	833		11	11	33	43		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Small Pit	174		12	12	33	43		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Johnny's PAG	7,302		-1	-1	2	10		-	6,207	-	-	-	-	-	-	-	1,095	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Overburden Areas Subtotal		**2,345**	15	15		30																																
601 OSA	150		7	7	10	10		-	-	-	-	-	-	-	-	-	150	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Ramona OSA	762		8	8	11	11		-	-	-	-	-	-	-	-	-	-	762	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Hayworth OSA	423		6	6	9	9		-	-	-	-	-	-	-	-	423	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Hilltop OSA	306		5	5	8	8		-	-	-	-	-	-	-	306	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
James OSA	325		4	4	7	7		-	-	-	-	-	-	325	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Robert OSA	379		3	3	6	6		-	-	-	-	-	379	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Site Surface Water Management Subtotal		**1,094**																																				
Stormwater and contact water controls	110		17	40	20	43		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	94	-	-	-	-	-	-	-	-	-	-	
Re-establish Drainages	984		7	12	10	15		-	-	-	-	-	-	-	-	-	89	455	-	-	-	440	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
TSF Subtotal		**15,279**																																				
TSF Impoundment	15,173		22	22	25	46		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12,897	-	-	-	-	-	
TSF Outlet Notch	98		22	22	25	25		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	98	-	-	-	-	-	
TSF Downchute	8		22	22	25	25		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-	-	
Mill Site and Associated Infrastructure Subtotal		**1,196**																																				
Dismantle Plant and Mill and Water Treatment Plant	732		16	17	43	43		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	724	-	-	-	-	-	-	-	-	-	-	
Reclaim Mill Site	223		17	18	20	20		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	223	-	-	-	-	-	-	-	-	-	-	
Service/Construction Roads	241		40	40	43	43		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Roads, Powerlines and Other Facilities Subtotal		**1,231**																																				
Remove Haul Roads	229		14	40	17	43		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	194	-	-	-	-	-	-	-	-	-	-	-	-	-	
Powerlines	202		40	40	43	43		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Pipelines	132		14	40	17	43		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	112	-	-	-	-	-	-	-	-	-	-	-	-	-	
Growth Media Stockpiles and Borrow Areas	188		15	15	18	25		-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	160	-	-	-	-	-		28	-	-	-	-	-	
Revegetate Holly Borrow Areas	109		3	3	6	6		-	-	-	-	-	109	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Revegetate Hock Borrow Areas	172		5	5	8	8		-	-	-	-	-	-	-	172	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
HGMC Detention and Diversion Structure	42		13	33	16	36		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Well Abandonment	157		12	63	12	63		-	-	-	-	-	-	-	-	-	-	-	118	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Post-Closure Subtotal		**1,649**																																				
Mine Site Post-closure maintenance and monitoring	903		63	63	63	63		-	-	-	-	-	-	-	-	-	-	-	-			18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
TSF Site Post-closure maintenance and monitoring	746		63	63	63	63		-	-	-	-	-	-	-	-	-	-	-	-		-	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15

TABLE 3
Romarco Minerals - Haile Gold Mine
Reclamation and Closure Cost Estimates
Bond Release Annual Summary Table

Facility	YR 32	YR 33	YR 34	YR 35	YR 36	YR 37	YR 38	YR 39	YR40	YR41	YR42	YR43	YR44	YR45	YR46	YR47	YR48	YR49	YR50	YR51	YR52	YR53	YR54	YR55	YR56	YR57	YR58	YR59	YR 60	YR 61	YR 62	YR 63+
Bond Releases Less Indirects	32	3,187	32	32	38	32	32	32	241	32	32	892	32	32	2,179	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	69
Indirect Costs	2	191	2	2	2	2	2	2	14	2	2	54	2	2	131	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4
Total Bond Releases	34	3,378	34	34	40	34	34	34	256	34	34	945	34	34	2,310	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	73
Open Pits Subtotal																																
Mill Zone Pit																														-	-	-
Haile Pit																														-	-	-
Red Hill Pit																														-	-	-
Ledbetter Pit		2,487										439																		-	-	
Snake Pit												22																		-	-	
Chase Pit																														-	-	-
Champion Pit		708										125																		-	-	
Small Pit		148										26																		-	-	
Johnny's PAG																														-	-	-
Overburden Areas Subtotal																																
601 OSA																														-	-	-
Ramona OSA																														-	-	-
Hayworth OSA																														-	-	-
Hilltop OSA																														-	-	-
James OSA																														-	-	-
Robert OSA																														-	-	-
Site Surface Water Management Subtotal																																
Stormwater and contact water controls												17																		-	-	
Re-establish Drainages																														-	-	-
TSF Subtotal																																
TSF Impoundment															2,276															-	-	
TSF Outlet Notch																														-	-	-
TSF Downchute																														-	-	-
Mill Site and Associated Infrastructure Subtotal																																
Dismantle Plant and Mill and Water Treatment Plant												7																		-	-	
Reclaim Mill Site																														-	-	-
Service/Construction Roads												241																		-	-	
Roads, Powerlines and Other Facilities Subtotal																																
Remove Haul Roads												34																		-	-	
Powerlines									202																					-	-	
Pipelines									20																					-	-	
Growth Media Stockpiles and Borrow Areas																														-	-	-
Revegetate Holly Borrow Areas																														-	-	-
Revegetate Hock Borrow Areas																														-	-	-
HGMC Detention and Diversion Structure					6																									-	-	
Well Abandonment																														-	-	39
Post-Closure Subtotal																																
Mine Site Post-closure maintenance and monitoring	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
TSF Site Post-closure maintenance and monitoring	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15

TABLE 4
Romarco Minerals - Haile Gold Mine
Reclamation and Closure Cost Estimates
Cost Breakdown Table

Facility		Item	Quantity	Units	Rate		Bonded Cost	Unit Cost Item or custom cost
							$34,764,979	
Open Pits								
	Mill Zone Pit							
		Recontour	47.0	ac	$446	/ac	$20,966	Slope Grading and Smoothing
		Growth Media Import	37,913	CY	$2.26	/CY	$85,684	Import and Place Growth Media
		Revegetate	47.0	ac	$1,540	/ac	$72,380	Revegetate
		Indirect Costs					$10,742	
		Subtotal					**$189,772**	
	Haile Pit							
		Recontour	40.0	ac	$446	/ac	$17,843	Slope Grading and Smoothing
		Growth Media Import	32,267	CY	$2.26	/CY	$72,923	Import and Place Growth Media
		Revegetate	40.0	ac	$1,540	/ac	$61,600	Revegetate
		Indirect Costs					$9,142	
		Subtotal					**$161,508**	
	Red Hill Pit							
		Slope Grading and Smoothing	36.0	ac	$446	/ac	$16,059	Slope Grading and Smoothing
		Growth Media Import	29,040	CY	$2.26	/CY	$65,630	Import and Place Growth Media
		Revegetate	36.0	ac	$1,540	/ac	$55,440	Revegetate
		Indirect Costs					$8,228	
		Subtotal					**$145,357**	
	Ledbetter Pit							
		Berms	1,119	ea	$2.26	/CY	$2,529	Import Soil and LGP Push
		Berms	1	ac	$1,540.00	/ac	$1,416	Revegetate
		Lime Amendment	15,968	tons	$169.10	/ton	$2,700,189	Lime Amendment
		Pit Lake Ecological Risk Assessment	0.3	LS	$50,000.00	LS	$16,667	Pit Lake Ecological Risk Assessment
		Channel Improvements	2	LS	$20,000	ea.	$40,000	$20,000
		Indirect Costs					$165,648	
		Subtotal					**$2,926,449**	
	Snake Pit							
		Slope Grading and Smoothing	36	CY	$446.08	/ac	$16,059	Slope Grading and Smoothing
		Growth Media Import	29,040	CY	$2.26	/CY	$65,630	Import and Place Growth Media
		Revegetate	36.0	ac	$1,540	/ac	$55,440	Revegetate
		Indirect Costs					$8,228	
		Subtotal					**$145,357**	
	Chase Pit							
		Slope Grading and Smoothing	23.0	ac	$446	/ac	$10,260	Slope Grading and Smoothing
		Growth Media Import	18,553	CY	$2.26	/CY	$41,931	Import and Place Growth Media
		Revegetate	23.0	ac	$1,540	/ac	$35,420	Revegetate
		Indirect Costs					$5,257	
		Subtotal					**$92,867**	
	Champion Pit							
		Lime Amendment	4,545	tons	$169.10	/ton	$768,560	Lime Amendment
		Pit Lake Ecological Risk Assessment	0.3	LS	$50,000.00	LS	$16,667	Pit Lake Ecological Risk Assessment
		Berms	304	ea	$2.26	/CY	$687	Import Soil and LGP Push
		Revegetate Berms	0.25	ea	$1,540.00	/ac	$385	Revegetate
		Indirect Costs					$47,178	
		Subtotal					**$833,476**	
	Small Pit							
		Lime Amendment	868	tons	$169.10	/ton	$146,779	Lime Amendment
		Pit Lake Ecological Risk Assessment	0.3	LS	$50,000.00	LS	$16,667	Pit Lake Ecological Risk Assessment
		Berms	304	ea	$2.26	/CY	$687	Import Soil and LGP Push
		Revegetate Berms	0.25	ea	$1,540.00	/ac	$385	Revegetate
		Indirect Costs					$9,871	
		Subtotal					**$174,388**	
Overburden Areas								
	Johnny's PAG							
		Foundation layer smooth roll	48,400	sy	$0.16	sy	$7,744	Subgrade Preparation
		HDPE textured	7,361,640	sq ft	$0.60	/sq ft	$4,416,984	HDPE dbl textured
		Growth Media Import	545,307	CY	$2.26	/CY	$1,232,393	Import and Place Growth Media
		Revegetate	169.0	ac	$1,540	/ac	$260,260	Revegetate
		6 in sand filter under downchute	2,416.67	CY	$25.89	/CY	$62,568	Import and Place Sand or Gravel
		12-in Riprap downchute, 18-in thick	7,250	CY	$15.03	/CY	$108,968	Import and Place Riprap
		Passive Treatment Cell	2	LS	$400,000	LS	$800,000	Passive Treatment Cell
		Indirect Costs					$413,335	
		Subtotal					**$7,302,251**	
	601 OSA							
		Growth Media Import	33,880	CY	$2.26	/CY	$76,569	Import and Place Growth Media
		Revegetate	42.0	ac	$1,540	/ac	$64,680	Revegetate
		6 in sand filter under downchute	0	CY	$25.89	/CY	$0	Import and Place Sand or Gravel
		12-in Riprap downchute, 18-in thick	0	CY	$15.03	/CY	$0	Import and Place Riprap
		Indirect Costs					$8,475	
		Subtotal					**$149,724**	
	Ramona OSA							
		Growth Media Import	129,067	CY	$2.26	/CY	$291,691	Import and Place Growth Media
		Revegetate	160.0	ac	$1,540	/ac	$246,400	Revegetate
		6 in sand filter under downchute	2,546	CY	$25.89	/CY	$65,924	Import and Place Sand or Gravel
		12-in Riprap downchute, 18-in thick	7,639	CY	$15.03	/CY	$114,813	Import and Place Riprap
		Indirect Costs					$43,130	
		Subtotal					**$761,956**	

TABLE 4
Romarco Minerals - Haile Gold Mine
Reclamation and Closure Cost Estimates
Cost Breakdown Table

							$34,764,979	
Facility		**Item**	**Quantity**	**Units**	**Rate**		**Bonded Cost**	**Unit Cost Item or custom cost**
	Hayworth OSA							
		Growth Media Import	73,407	CY	$2.26	/CY	$165,899	Import and Place Growth Media
		Revegetate	91.0	ac	$1,540	/ac	$140,140	Revegetate
		6 in sand filter under downchute	1,310	CY	$25.89	/CY	$33,921	Import and Place Sand or Gravel
		12-in Riprap downchute, 18-in thick	3,931	CY	$15.03	/CY	$59,076	Import and Place Riprap
		Indirect Costs					$23,942	
		Subtotal					**$422,978**	
	Hilltop OSA							
		Growth Media Import	53,240	CY	$2.26	/CY	$120,322	Import and Place Growth Media
		Revegetate	66.0	ac	$1,540	/ac	$101,640	Revegetate
		6 in sand filter under downchute	944	CY	$25.89	/CY	$24,452	Import and Place Sand or Gravel
		12-in Riprap downchute, 18-in thick	2,833	CY	$15.03	/CY	$42,585	Import and Place Riprap
		Indirect Costs					$17,340	
		Subtotal					**$306,339**	
	James OSA							
		Growth Media Import	56,467	CY	$2.26	/CY	$127,615	Import and Place Growth Media
		Revegetate	70.0	ac	$1,540	/ac	$107,800	Revegetate
		6 in sand filter under downchute	1,000	CY	$25.89	/CY	$25,890	Import and Place Sand or Gravel
		12-in Riprap downchute, 18-in thick	3,000	CY	$15.03	/CY	$45,090	Import and Place Riprap
		Indirect Costs					$18,384	
		Subtotal					**$324,778**	
	Robert OSA							
		Growth Media Import	68,567	CY	$2.26	/CY	$154,961	Import and Place Growth Media
		Revegetate	85.0	ac	$1,540	/ac	$130,900	Revegetate
		6 in sand filter under downchute	1,009	CY	$25.89	/CY	$26,130	Import and Place Sand or Gravel
		12-in Riprap downchute, 18-in thick	3,028	CY	$15.03	/CY	$45,508	Import and Place Riprap
		Indirect Costs					$21,450	
		Subtotal					**$378,948**	
Site Surface Water Management								
	Stormwater and contact water controls							
		Regrading ponds and channels	50.0	ac	$446	/ac	$22,304	Slope Grading and Smoothing
		Test sediments	15.0	sample	$325	ea	$4,875	Post-closure SW Sample
		Revegetate	50.0	ac	$1,540	/ac	$77,000	Revegetate
		Indirect Costs					$6,251	
		Subtotal					**$110,430**	
	Re-establish Drainages							
		Channel Restoration - Tributary to North Fork	374	ea	$225	/ft	$84,150	Channel Restoration
		Channel Restoration - North Fork	1,907	ea	$225	/ft	$429,075	Channel Restoration
		Channel Restoration - HGMC	1,845	ea	$225	/ft	$415,125	Channel Restoration
		Indirect Costs					$55,701	
		Subtotal					**$984,051**	
TSF								
	TSF Impoundment							
		Import and place foundation	377,680	CY	$2.26	/CY	$853,557	Import Soil and LGP Push
		Smooth roll subgrade	755,360	sy	$0.10	/CY	$75,536	Compact Cohesive Soil
		HDPE Smooth	17,249,760	sq ft	$0.55	/sq ft	$9,487,368	HDPE smooth
		Growth Media Import	1,277,760	CY	$2.26	/CY	$2,887,738	Import and Place Growth Media
		Revegetate	396.0	ac	$1,540	/ac	$609,840	Revegetate
		Passive Treatment Cell	1	LS	$400,000	LS	$400,000	Passive Treatment Cell
		Indirect Costs					$858,842	
		Subtotal					**$15,172,881**	
	TSF Outlet Notch							
		Excavate Notch	7,000	CY	$0.61	/CY	$4,270	Channel Excavation
		Rockfill Drain - Control	3,250	CY	$25.89	/CY	$84,143	Import and Place Sand or Gravel
		Rockfill Drain - Protective	250	CY	$15.03	/CY	$3,758	Import and Place Riprap
		Indirect Costs					$5,530	
		Subtotal					**$97,700**	
	TSF Downchute							
		Channel Excavation	1,778	CY	$0.61	/CY	$1,084	Channel Excavation
		6 in sand filter	93	CY	$25.89	/CY	$2,397	Import and Place Sand or Gravel
		10-in Riprap, 15-in thick	231	CY	$15.03	/CY	$3,479	Import and Place Riprap
		Excavate Channel	593	CY	$0.61	/CY	$361	Channel Excavation
		Revegetate Channel	0.3	ac	$1,540	/ac	$389	Revegetate
		Indirect Costs					$463	
		Subtotal					**$8,174**	
Mill Site and Associated Infrastructure								
	Dismantle Plant and Mill and Water Treatment Plant							
		Mill Decommission	1	ea	$25,000	LS	$25,000	Mill Decommissioning
		Mill site Demolition and WTP demolition	665122	ea	1	LS	$665,122	Mill and Process Plant Demolition
		Indirect Costs					$41,407	
		Subtotal					**$731,529**	
	Reclaim Mill Site							
		Rubilize and bury concrete slab	434	CY	$8.00	/CY	$3,472	Concrete Demolition
		Bury concrete in place	9,823	Cy	$2.57	/CY	$25,245	Import and Place Inert Layer
		Growth media import	9,823	CY	$2.26	/CY	$22,200	Import and Place Growth Media
		Revegetate Building Sites	103.3	ac	$1,540	/ac	$159,049	Revegetate
		Indirect Costs					$12,598	
		Subtotal					**$222,564**	

TABLE 4
Romarco Minerals - Haile Gold Mine
Reclamation and Closure Cost Estimates
Cost Breakdown Table

						$34,764,979	
Facility	**Item**	**Quantity**	**Units**	**Rate**		**Bonded Cost**	**Unit Cost Item or custom cost**
Service/Construction Roads							
	Regrade Roads	100.0	ac	$446	/ac	$44,599	Slope Grading and Smoothing
	Scarify Roads	100.0	ac	$184	/ac	$18,429	Scarify
	Remove culverts	950.00	ft	$11.40	/lin ft	$10,830	Remove Culverts and Regrade
	Revegetate Roads	100.0	ac	$1,540	/ac	$153,968	Revegetate
	Indirect Costs					$13,670	
	Subtotal					**$241,496**	
Roads, Powerlines and Other Facilities							
Remove Haul Roads							
	Regrade Roads	85.5	ac	$446	/ac	$38,132	Slope Grading and Smoothing
	Scarify Roads	85.5	ac	$184	/ac	$15,757	Scarify
	Remove culverts	2,650.00	ft	$11.40	/lin ft	$30,210	Remove Culverts and Regrade
	Revegetate Roads	85.5	ac	$1,540	/ac	$131,643	Revegetate
	Indirect Costs					$12,945	
	Subtotal					**$228,686**	
Powerlines							
	Dismantal and remove Powerline	22,176	ft	$8.61	/lin ft	$190,935	Remove and Demo Powerline
	Indirect Costs					$11,456	
	Subtotal					**$202,391**	
Pipelines							
	Demo Pipelines	71,200	ft	$1.75	/lin ft	$124,600	Remove and Demo Pipeline
	Indirect Costs					$7,476	
	Subtotal					**$132,076**	
Growth Media Stockpiles and Borrow Areas							
	Scarify Snake GM Stockpile	13.0	ac	$184	/ac	$2,396	Seed bed Prep
	Revegetate Snake GM Stockpile	13.0	ac	$1,540	/ac	$20,016	Revegetate
	Revegetate 601 GM Stockpile	15.0	ac	$1,540	/ac	$23,095	Revegetate
	Scarify 601 GM Stockpile	15.0	ac	$184	/ac	$2,764	Seed bed Prep
	Revegetate Hayworth Site GM Stockpile	19.0	ac	$1,540	/ac	$29,254	Revegetate
	Scarify Hayworth GM Stockpile	19.0	ac	$184	/ac	$3,502	Seed bed Prep
	Revegetate TSF GM Stockpile	56.0	ac	$1,540	/ac	$86,222	Revegetate
	Scarify TSF GM Stockpile	56.0	ac	$184	/ac	$10,320	Seed bed Prep
	Revegetate Holly Borrow Areas	66.5	ac	$1,540	/ac	$102,430	Revegetate
	Revegetate Hock Borrow Areas	105.5	ac	$1,540	/ac	$162,419	Revegetate
	Indirect Costs					$26,545	
	Subtotal					**$468,964**	
HGMC Detention and Diversion Structure							
	Modify or Remove Embankment	67,360	CY	$0.37	cy	$24,923	Grading
	Seedbed prp	8.7	ac	$184	/ac	$1,603	Seed bed Prep
	Revegetate	8.7	ac	$1,540	/ac	$13,395	Revegetate
	Indirect Costs					$2,395	
	Subtotal					**$42,317**	
Well Abandonment							
	Abandon wells and piezometers	53	ea	$2,790	LS	$147,870	Well Abandoment
	Indirect Costs					$8,872	
	Subtotal					**$156,742**	
Post-Closure							
Mine Site Post-closure maintenance and monitoring							
	On-site maintenance and inspection -short term	6	yrs	$56,000	/yr	$336,000	Post-closure Maintenance
	On-site maintenance and inspection - long term	16	yrs	$10,000	/yr	$162,000	Post-closure Maintenance
	pit sampling and monitoring	32	yrs	$5,000	/yr	$160,000	Post-closure Maintenance
	Passive Treatment Cell Replacement	4	yrs	$10,000	/yr	$40,000	Passive Treatment Cell Replacement
	Groundwater sampling and analysis	459	ea	$325	ea	$149,175	Post-closure GW Sample
	Surface Water sampling and analysis	15	ea	$325	ea	$4,875	Post-closure SW Sample
	Indirect Costs					$51,123	
	Subtotal					**$903,173**	
TSF Site Post-closure maintenance and monitoring							
	On-site maintenance and inspection -short term	5	yrs	$56,000	/yr	$291,200	Post-closure Maintenance
	On-site maintenance and inspection - long term	14	yrs	$10,000	/yr	$144,000	Post-closure Maintenance
	Passive Treatment Cell Replacement	1	yrs	$200,000	/yr	$200,000	Passive Treatment Cell Replacement
	Groundwater sampling and analysis	158	ea	$325	ea	$51,350	revegetate
	Surface Water sampling and analysis	52	ea	$325	ea	$16,900	Post-closure SW Sample
	Indirect Costs					$42,207	
	Subtotal					**$745,657**	

Table 5
Romarco Minerals - Haile Gold Mine
Reclamation and Closure Cost Estimates
Unit Cost Assumptions

Item	Unit cost	per	
Indirect Costs % of sub total	6.0%	Includes contract administration, administration, overhead and profit and engineering	
Item	**Unit cost**	**per**	
Channel Excavation	$0.61	/CY	Track hoe Model 345B Excavation @ 1.5 cy bucket = 200 cy/hr. Assume track hoe Model 345B @ $121.21/hr. = $0.61/cy (SRCE) (Production estimates for track hoe from Cat Performance Handbook; 29th Edition. Hourly equipment rate from SRCE, 2013.). Including $18.00/hr labor.
Channel Restoration	$225.00	/ft	Costs based on upstate averages and availability for small streams (AMEC)
Clear and Grub	$791.11	/ac	2013 Capital Cost Estimate - AMEC
Compact Cohesive Soil	$0.10	/CY	Vibratory Roller CS533E @ $56.03/hr 6" Lifts, 2 Passes. 6 in yd3/hr compacted lift thickness = 570.5 (Production estimates for Vibratory Roller from Cat Performance Handbook; 29th Edition) (Hourly equipment rate from SRCE, 2013) Including $14.15/hr labor.
Concrete Demolition	$8.00	/CY	Based on SRCE model using a Cat 345B to break foundations
Demo Plastic Liner	$0.03	/sq ft	Presumed @demolition with loader @ 0.5 acres/hour @ $142.38/hr. = $284.76/acre (SRCE, 2013). Loading, Transportation & disposal @ 10 cy/acre @ $100/cy total cost = $1,000. total cost = $1,284.76/acre = $0.029/sf. Labor cost of $10.50/hr.
Geotextile 12 oz	$2.05	/SY	Quote - Layfield Engineered Membranes & Films (EMF) Assumptions include: Liner will terminate in a perimeter anchor trench, full crew for liner installation services, no pipe penetrations or mechanical attachments to structures, taxes not included, no costs of bonds, earthworks, including digging and backfilling anchor trenches, to be done by others,
HDPE dbl textured	$0.60	/sq ft	Quote - Layfield Engineered Membranes & Films (EMF) Assumptions include: Liner will terminate in a perimeter anchor trench, full crew for liner installation services, no pipe penetrations or mechanical attachments to structures, taxes not included, no costs of bonds, earthworks, including digging and backfilling anchor trenches, to be done by others,
HDPE smooth	$0.55	/sq ft	Quote - Layfield Engineered Membranes & Films (EMF) Assumptions include: Liner will terminate in a perimeter anchor trench, full crew for liner installation services, no pipe penetrations or mechanical attachments to structures, taxes not included, no costs of bonds, earthworks, including digging and backfilling anchor trenches, to be done by others,
Import Soil and LGP Push	$2.26	/CY	Material Provided on site. Loader Excavation @ 5 cy bucket = 400 cy/hr from stockpile. Presumed haulage cycle time = 7 min each or 7 trips/hr. Truck requirements @ 25 cy/truck = 3 trucks. Dozer placement @ 400 cy/hr. (normal 520 lcy/hr limited by haulage and ground pressure; D8 LGP with universal blade). Water truck for moisture control. Assume loader 385BL @ $224.48/hr, 3 trucks Model 735 @ $133.74/hr each, dozer @ $184.33/hr + water truck 613E @ $94.15/hr = $904.18/hr total = $2.26/cy. (Production estimates for track hoe from Cat Performance Handbook; 29th Edition. Hourly equipment rates from SRCE.). Labor cost of $18.00/hr.
Import and Place Clay	$4.67	/CY	Material Provided on site. Track hoe Excavation 345B @ 1.5 cy bucket = 200 cy/hr. Presumed haulage cycle time = 20 min each or 3 trips/hr. Truck requirements 735 @ 25 cy/truck = 4 trucks. Dozer placement @ 200 cy/hr. (normal 520 lcy/hr limited by haulage; D8 with universal blade). Water truck 613E for moisture control. Assume track hoe 345B @ $121.21/hr, 4 trucks @ $133.74/hr each, dozer @ $184.33/hr + water truck @ $94.15/hr = $934.65/hr total = $4.67/cy. (Production estimates for track hoe from Cat Performance Handbook; 29th Edition. Hourly equipment rates from SRCE.). Labor cost of $18.00/hr.
Import and Place Growth Media	$2.26	/CY	Material Provided on site. Loader Excavation 385BL @ 5 cy bucket = 400 cy/hr from stockpile. Presumed haulage cycle time = 7 min each or 7 trips/hr. Truck requirements @ 25 cy/truck = 3 trucks. Dozer placement @ 400 cy/hr. (normal 520 lcy/hr limited by haulage; D8 with universal blade). Water truck for moisture control. Assume loader 385BL @ $224.48/hr, 3 trucks @ $133.74/hr each + dozer @ $184.33/hr + water truck @ $94.15/hr = $904.18/hr total = $2.26/cy. (Production estimates for track hoe from Cat Performance Handbook; 29th Edition. Hourly equipment rates from SRCE.). Labor cost of $18.00/hr.
Import and Place Inert Layer	$2.57	/CY	Material Provided on site. Loader Excavation 385BL @ 5 cy bucket = 400 cy/hr from stockpile. Presumed haulage cycle time = 7 min each or 7 trips/hr. Truck requirements @ 25 cy/truck = 3 trucks. Dozer placement @ 400 cy/hr. (normal 520 lcy/hr limited by haulage; D8 with universal blade). Water truck for moisture control. Assume loader 385BL@ $224.48/hr, 3 trucks @ $133.74/hr each, dozer @ $184.33/hr + water truck @ $94.15/hr = $1027.91/hr total = $2.57/cy. (Production estimates for track hoe from Cat Performance Handbook; 29th Edition. Hourly equipment rates assumed.). Labor cost of $18.00/hr.
Import and Place Organic Layer	$15.03	/CY	Loader Excavation @ 5cy bucket = 400 cy/hr from stockpile. Truck requirements @ 25cy/truck = 3 trucks. Dozer placement @ 400 cy/hr. (normal 520 lcy/hr limited by haulage; D8 with universal blade). Rip rap and rock lining 18" thick minimum = $6.50/sy = $13.00/cy. Assume Loader 385BL @ $224.48/hr, 3 trucks @ $133.74/hr each, dozer @$184.33/hr = $810.03 (SRCE 2013)

Table 5
Romarco Minerals - Haile Gold Mine
Reclamation and Closure Cost Estimates
Unit Cost Assumptions

Import and Place Riprap	$15.03	/CY	Loader Excavation @ 5cy bucket = 400 cy/hr from stockpile. Truck requirements @ 25cy/truck = 3 trucks. Dozer placement @ 400 cy/hr. (normal 520 lcy/hr limited by haulage; D8 with universal blade). Rip rap and rock lining 18" thick minimum = $6.50/sy = $13.00/cy. Assume Loader 385BL @ $224.48/hr, 3 trucks @ $133.74/hr each, dozer @$184.33/hr = $810.03 (SRCE 2013)
Import and Place Sand or Gravel	$25.89	/CY	Sand & Gravel purchase cost FOB mine @ $24/cy (quote from construction cost; Loading from stockpile using loader @ 500 cy/hr; Hauling to site @ 10 min/load using four 25 cy trucks; and D8 dozer placement @ 500 cy/hr (normal 520 lcy/hr limited by haulage). Assume loader 385BL @ $224.48/hr, 4 (735) trucks @ $133.74/hr each + dozer @ $184.33/hr = $943.77/hr total = $1.89/cy + $24/cy purchase = $25.89/cy total. (Production estimates for track hoe from Cat Performance Handbook; 29th Edition. Hourly equipment rates from SRCE, 2013. Labor cost of $18.00/hr.
Lime Amendment	$169.10	/ton	Per Mississippi Lime quoite 3 October 2013- delivered
Mill and Process Plant Demolition	1.00	LS	Cost based on Nevada SRCE model with following assumptions: Total building volume = 1,631,500 cf; Total 3 ft thick slab area = 25,600 sf; Total 1 foot slab area - 50,625 sf; Total 3 ft thick slab volume = 2,844 cy; Total 1 ft thick slab volume = 1,875 cy.
Passive Treatment Cell	$400,000.00	LS	Based on historic costs for Chase Leach Pad previous Haile Mine BMP facilities
Remove and Demo Pipeline	$1.75	/lin ft	SRCE spreadsheet equipment cost, 2013. Davis Bacon Labor Rate = $11.56. 0.08 labor hours per linear foot from RS Means
Remove and Demo Powerline	$8.61	/lin ft	Single pole power line demo $38,739.00/mile SRCE spreadsheet, 2013
Revegetate	$1,540.00	/ac	Labor Rate = $30.00/ac Equipment Rate = $225.00/ac Seed Mix = $185.00/50 lb bag 75 lb/ac, lime and fertilizer costs from SRCE spreadsheet for Broadcast-Mechanical, 2013
Scarify	$184.33	/ac	Scarify subsoil, large commercial 75 hp dozer with scarifier = $184.33/hr, SRCE 2013
Seed bed Prep	$184.33	/ac	Presumed @ same cost as scarifying @ $209.16/acre.
Slope Grading and Smoothing	$446.08	/ac	300 hp dozer, ideal conditions, 200 foot push; Production estimates for track hoe from Cat Performance Handbook. Assumed scratch depth of 0.75' = 32,670 cf/acre or 1210 cy/ac. Dozer placement @ 500 cy/hr. (normal 520 lcy/hr limited by haulage and ground pressure. Dozer @ $184.33/hr = $446.08/ac total Cost calculated at $446.08/acre.
Grading	$0.37	cy	Assumed scratch depth of 0.75' = 32,670 cf/acre or 1210 cy/ac. Dozer placement @ 500 cy/hr. (normal 520 lcy/hr limited by haulage and ground pressure. Dozer @ $184.33/hr
Supply and Place Erosion Control Mat	$0.48	/SY	$8.32/sy; Nylon, 3 dimensional geomatrix, 18 mil thick; RS Means Heavy Construction Cost Data Online; 2012.
Salvage Chainlink Fencing - 8 ft.	$18.20	/ft	Fencing demolition, remove & reset chain link posts & fabric, 8' to 10' high bare total = $18.03 RS Means Cost Data Online, 2013
Remove Culverts and Regrade	$11.40	/lin ft	Selective demolition, metal drainage piping, CMP, steel, 30"-36", diameter, excludes excavation - 6.96/lin ft plus 5 CY/lin ft excavation as above (.75/CY)=4.44. Total $15.75/lin ft. SRCE, 2013
Post-closure GW Sample	$325.00	ea	SRCE spreadsheet, 2013
Post-closure SW Sample	$325.00	ea	SRCE spreadsheet, 2013
Post-closure Maintenance - short term	$56,000	/yr	Estimated based on previous Haile Mine maintenance
Passive Treatment Cell Replacement	$200,000.00	/yr	assume 50% cost to replace every 20 yrs
2" Pipe in Trench	$3.44	/lin ft	SRCE spreadsheet, 2013
Well Abandonment	$2,790.00	LS	Avg. per well estimated cost to abandon monitoring wells, 40 dewatering wells with average depth of 450 ft, 18,000 total footage, $5.47 per ft materials; 11 2" monitoring wells with avg depth of 130 ft, 1430 total footage, $1.44 per ft materials; 12 4" monitoring wells with avg depth of 500 ft, total footage of 6000 ft, $0.35 per foot materials. $3000/day rig time (21 days), 3 wells per day average, $10,000 mob/demob

Table 6
Romarco Minerals - Haile Gold Mine
Reclamation and Closure Cost Estimates
Interim Quantity Annual Contribution

Activity/Description	Interim Quantity Total	Unit	PP	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6	YR 7	YR 8	YR 9	YR 10	YR 11	YR 12	YR 13	YR 14	YR 15	YR 16	YR 17	YR 18	YR 19	YR 20	YR 21	YR 22	YR 23	YR 24	YR 25	YR 26
Mill Pit																													
Begin Pit Development	PP	NA	**100%**																										
Reclamation Cover less channel	2,047,320	sq ft									2,047,320																		
											2,047,320	100%																	
Haile Pit																													
Begin Pit Development	Yr 3	NA				100%																							
Reclamation Cover (less channel)	1,742,400	sq ft										1,742,400																	
												1,555,200	112%																
Red Hill Pit																													
Begin Pit Development	Yr 4	NA					100%																						
Reclamation Cover	1,568,160	sq ft														1,568,160													
																1,568,160	100%												
Snake Pit																													
Begin Pit Development	Yr 1	NA		100%																									
Reclamation Cover	1,568,160	sq ft							1,568,160																				
									1,568,160	100%																			
Chase Pit																													
Begin Pit Development	Yr 7	NA								100%																			
Reclamation Cover	1,001,880	sq ft													1,001,880														
															1,001,880	100%													
Ledbetter Pit																													
Begin Pit Development	Yr 4	NA					100%																						
Pit perimeter	1,119	ft														1,119													
Revegetate berms	0.92	ft														1,119													
Inlet/Outlet improvements	2	LS														1													
Pit Lake ecological risk assessment	1	ea																											
Lime Addition	15,968	Tons														4,944	3,212	1,619	1,368	1,148	958	837	602	456	349	248	152	75	
Champion Pit																													
Begin Pit Development	Yr 9	NA										100%																	
Pit perimeter	304	ft												304															
Revegetate berms	0.25	ac												304															
Pit Lake ecological risk assessment	1	ea																											
Lime Addition	4,545	LS												835	1,002	663	534	369	303	225	171	131	99	75	53	36	25	15	7
Small Pit																													
Begin Pit Development	Yr 11	NA												100%															
Pit perimeter	304	ft													304														
Revegetate berms	0.25	ac													304														
Pit Lake ecological risk assessment	1	ea																											
Lime Addition	868	LS													57	44	37	33	31	29	28	26	25	24	23	22	21	19	18
Johnny's Overburden																													
Begin Dump Development	Multiple Phases	NA	62%		38%																								
Install Cover Layer	7,361,640	sq ft																7361640											
Construct Downchute	5,220	ft																5220											
Pipeline to passive cells	4,240	ft																					4,240						
Construct Passive Treatment Cell	2	LS																					2						
Hilltop Overburden																													
Begin Dump Development	Yr 3	NA				100%																							
Growth medium and Revegetation	2,874,960	sq ft						2,874,960																					
Construct Downchute	2,040	ft						2040																					
Robert Overburden																													
Begin Dump Development	Yr 1	NA		100%																									
Growth medium and Revegetation	3,702,600	sq ft				3,702,600																							
Construct Downchute	2,180	ft				2,180																							
601 Overburden																													
Begin Dump Development	PP	NA	100%																										
Growth Medium and Revegetation	1,829,520	sq ft								1829520																			
Ramonas Overburden																													
Begin Dump Development	PP	NA	100%																										
Revegetation	6,969,600	sq ft									6,969,600																		
Construct Downchute	5,500	ft									5500																		
James Overburden																													
Begin Dump Development	Yr 2	NA			100%																								
Revegetation	3,049,200	sq ft					3,049,200																						
Construct Downchute	2,160	ft					2,160																						
Hayworth Overburden																													
Begin Dump Development	Yr 3	NA				100%																							
Revegetation	3,963,960	sq ft							3963960																				
Construct Downchute	2,830	ft							2830																				
TSF Impoundment																													
Begin TSF	Multiple Phases	NA	80%		7%		7%			7%																			
Covering Fill	377,680	CY																47,210	47,210	47,210	47,210	47,210	47,210	47,210	47,210				
Liner Placement	17,249,760	sq ft																6,037,416	5,174,928	2,587,464		862,488			2,587,464				
Reclamation Cover	17,249,760	sq ft																6,037,416	5,174,928	2,587,464		862,488			2,587,464				
Construct Interior Channel	5,800	lin ft																3,400		700		700			1,000				

Table 6
Romarco Minerals - Haile Gold Mine
Reclamation and Closure Cost Estimates
Interim Quantity Annual Contribution

Activity/Description	Interim Quantity Total	Unit	YR 27	YR 28	YR 29	YR 30	YR 31	YR 32	YR 33	YR 34	YR 35	YR 36	YR 37	YR 38	YR 39	YR 40	YR 41	YR 42	YR 43	YR 44	YR 45	YR 46	YR 47	YR 48	YR 49	YR 50	YR51	YR52	YR53
Mill Pit																													
Begin Pit Development	PP	NA																											
Reclamation Cover less channel	2,047,320	sq ft																											
Haile Pit																													
Begin Pit Development	Yr 3	NA																											
Reclamation Cover (less channel)	1,742,400	sq ft																											
Red Hill Pit																													
Begin Pit Development	Yr 4	NA																											
Reclamation Cover	1,568,160	sq ft																											
Snake Pit																													
Begin Pit Development	Yr 1	NA																											
Reclamation Cover	1,568,160	sq ft																											
Chase Pit																													
Begin Pit Development	Yr 7	NA																											
Reclamation Cover	1,001,880	sq ft																											
Ledbetter Pit																													
Begin Pit Development	Yr 4	NA																											
Pit perimeter	1,119	ft																											
Revegetate berms	0.92	ft																											
Inlet/Outlet improvements	2	LS																											
Pit Lake ecological risk assessment	1	ea							1																				
Lime Addition	15,968	Tons																											
Champion Pit																													
Begin Pit Development	Yr 9	NA																											
Pit perimeter	304	ft																											
Revegetate berms	0.25	ac																											
Pit Lake ecological risk assessment	1	ea							1																				
Lime Addition	4,545	LS	2																										
Small Pit																													
Begin Pit Development	Yr 11	NA																											
Pit perimeter	304	ft																											
Revegetate berms	0.25	ac																											
Pit Lake ecological risk assessment	1	ea							1																				
Lime Addition	868	LS	17	15	14	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
Johnny's Overburden																													
Begin Dump Development	Multiple Phases	NA																											
Install Cover Layer	7,361,640	sq ft																											
Construct Downchute	5,220	ft																											
Pipeline to passive cells	4,240	ft																											
Construct Passive Treatment Cell	2	LS																											
Hilltop Overburden																													
Begin Dump Development	Yr 3	NA																											
Growth medium and Revegetation	2,874,960	sq ft																											
Construct Downchute	2,040	ft																											
Robert Overburden																													
Begin Dump Development	Yr 1	NA																											
Growth medium and Revegetation	3,702,600	sq ft																											
Construct Downchute	2,180	ft																											
601 Overburden																													
Begin Dump Development	PP	NA																											
Growth Medium and Revegetation	1,829,520	sq ft																											
Ramonas Overburden																													
Begin Dump Development	PP	NA																											
Revegetation	6,969,600	sq ft																											
Construct Downchute	5,500	ft																											
James Overburden																													
Begin Dump Development	Yr 2	NA																											
Revegetation	3,049,200	sq ft																											
Construct Downchute	2,160	ft																											
Hayworth Overburden																													
Begin Dump Development	Yr 3	NA																											
Revegetation	3,963,960	sq ft																											
Construct Downchute	2,830	ft																											
TSF Impoundment																													
Begin TSF	Multiple Phases	NA																											
Covering Fill	377,680	CY																											
Liner Placement	17,249,760	sq ft																											
Reclamation Cover	17,249,760	sq ft																											
Construct Interior Channel	5,800	lin ft																											

Table 6
Romarco Minerals - Haile Gold Mine
Reclamation and Closure Cost Estimates
Interim Quantity Annual Contribution

	Activity/Description	Interim Quantity Total	Unit	YR54	YR55	YR56	YR57	YR58	YR59	YR60	YR61	YR62	YR63+
Mill Pit													
	Begin Pit Development	PP	NA										
	Reclamation Cover less channel	2,047,320	sq ft										
Haile Pit													
	Begin Pit Development	Yr 3	NA										
	Reclamation Cover (less channel)	1,742,400	sq ft										
Red Hill Pit													
	Begin Pit Development	Yr 4	NA										
	Reclamation Cover	1,568,160	sq ft										
Snake Pit													
	Begin Pit Development	Yr 1	NA										
	Reclamation Cover	1,568,160	sq ft										
Chase Pit													
	Begin Pit Development	Yr 7	NA										
	Reclamation Cover	1,001,880	sq ft										
Ledbetter Pit													
	Begin Pit Development	Yr 4	NA										
	Pit perimeter	1,119	ft										
	Revegetate berms	0.92	ft										
	Inlet/Outlet improvements	2	LS										
	Pit Lake ecological risk assessment	1	ea										
	Lime Addition	15,968	Tons										
Champion Pit													
	Begin Pit Development	Yr 9	NA										
	Pit perimeter	304	ft										
	Revegetate berms	0.25	ac										
	Pit Lake ecological risk assessment	1	ea										
	Lime Addition	4,545	LS										
Small Pit													
	Begin Pit Development	Yr 11	NA										
	Pit perimeter	304	ft										
	Revegetate berms	0.25	ac										
	Pit Lake ecological risk assessment	1	ea										
	Lime Addition	868	LS	13	13	13	13	13	13	13	13	13	13
Johnny's Overburden													
	Begin Dump Development	Multiple Phases	NA										
	Install Cover Layer	7,361,640	sq ft										
	Construct Downchute	5,220	ft										
	Pipeline to passive cells	4,240	ft										
	Construct Passive Treatment Cell	2	LS										
Hilltop Overburden													
	Begin Dump Development	Yr 3	NA										
	Growth medium and Revegetation	2,874,960	sq ft										
	Construct Downchute	2,040	ft										
Robert Overburden													
	Begin Dump Development	Yr 1	NA										
	Growth medium and Revegetation	3,702,600	sq ft										
	Construct Downchute	2,180	ft										
601 Overburden													
	Begin Dump Development	PP	NA										
	Growth Medium and Revegetation	1,829,520	sq ft										
Ramonas Overburden													
	Begin Dump Development	PP	NA										
	Revegetation	6,969,600	sq ft										
	Construct Downchute	5,500	ft										
James Overburden													
	Begin Dump Development	Yr 2	NA										
	Revegetation	3,049,200	sq ft										
	Construct Downchute	2,160	ft										
Hayworth Overburden													
	Begin Dump Development	Yr 3	NA										
	Revegetation	3,963,960	sq ft										
	Construct Downchute	2,830	ft										
TSF Impoundment													
	Begin TSF	Multiple Phases	NA										
	Covering Fill	377,680	CY										
	Liner Placement	17,249,760	sq ft										
	Reclamation Cover	17,249,760	sq ft										
	Construct Interior Channel	5,800	lin ft										

Table 6
Romarco Minerals - Haile Gold Mine
Reclamation and Closure Cost Estimates
Interim Quantity Annual Contribution

	Activity/Description	Interim Quantity Total	Unit	PP	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6	YR 7	YR 8	YR 9	YR 10	YR 11	YR 12	YR 13	YR 14	YR 15	YR 16	YR 17	YR 18	YR 19	YR 20	YR 21	YR 22	YR 23	YR 24	YR 25	YR 26
	Outlet Notch liner removal	1,810	sq ft																							1,810				
	Outlet Notch Excavation	7,000	CY																							7,000				
	Outlet Rockfill Placement	3,250	CY																							3,250				
	Outlet Rockfill Placement	250	CY																							250				
	Downchute Excavation	200	ft																							200				
	Outfall channel	500	ft																							500				
GM Stockpile																														
	Disturbance	PP	NA	100%																										
	Restore Ground	566,280	sq ft													566,280														
	Restore Ground	653,400	sq ft													653,400														
	Restore Ground	827,640	sq ft													827,640														
	Restore Ground	2,439,360	sq ft																		2,439,360									
	Restore Holly Ground	2,897,917	sq ft				2,897,917																							
	Restore Hock Ground	4,595,080	sq ft						4,595,080																					
Plant Demolition																														
	Disturbance	PP	NA	100%																										
	Demo Mill Site Buildings	665,122.00	LS																329061	329061										
	Decommision Mill	1.00	LS																1											
	Demo Concrete	434	CY																		434									
	Bury Concrete	9,823	CY																		9823									
	Import GM	9,823	CY																		9823									
	Restore Ground	4,499,748	sq ft																		4499748									
Service/Construction Road Removal																														
	Disturbance	PP	NA	100%																										
	Restore Ground	4,356,000	sq ft									871200	435600	435600	435600	435600		1742400												
	Culverts to remove	950	ft									100	50					800												
Haul Road Removal																														
	Disturbance	PP	NA	100%																										
	Restore Ground	3,724,380	sq ft					21780	217800		217800	217800	217800			217800		2613600												
	Culverts to remove	2,650	ft					800			120	120	60					1550												
Powerline Removal																														
	Disturbance	PP	NA	100%																										
	Remove Powerline	4.2	mile																											
Pipeline Removal																														
	Disturbance	PP	NA	100%																										
	Remove Pipeline	71,200	lin ft																	30500										
Surface water controls																														
	Disturbance	PP	NA	100%																										
	Reveg sw ponds and misc. disturbance	50	ac																		40									
	Test sediments	15	samples														15													
	re-establish North Fork	1,907	ft									1907																		
	re-establish HGMC	1,845	ft													1845														
	re-establish 601 drainage	374	ft								374																			
HGMC Detention/Diversion Structure																														
	Disturbance	Yr 2	NA			100%																								
	Modify or Remove Embankment	67,360	CY														47360													
	Revegetation	378,972	sq ft															378972												
	wells installed	PP	NA	100%																										
	wells to abandon	53	ea													40														
Post-Closure Monitoring and Maintenance		Yr 5	NA						100%																					
	mine site monitoring annual maintenance-st	6	ea																0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6		
	mine site monitoring annual maintenance-lt	16	ea																										0.6	0.6
	pit sampling and monitoring	32	ea													1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Replace passive cell at JPAG	4	ea																											
	Number of GW sampling at mine site	459	ea														9	9	9	9	9	9	9	9	9	9	9	9	9	9
	SW sampling annual cost for Mine	240	ea																16	16	16	8	8	4	4	4	4	4	4	4
	TSF site monitoring annual maintenance -st	5	ea																0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
	TSF site monitoring annual maintenance - lt	14	ea																											
	Replace passive cell at tsf site	1	ea																											
	GW sampling annual cost for TSF	158	ea																8	8	8	8	8	8	8	8	8	8	2	2
	SW sampling annual cost for TSF	52	ea																2	2	2	2	2	2	2	8	8	8	2	2

Table 6
Romarco Minerals - Haile Gold Mine
Reclamation and Closure Cost Estimates
Interim Quantity Annual Contribution

Activity/Description	Interim Quantity Total	Unit	YR 27	YR 28	YR 29	YR 30	YR 31	YR 32	YR 33	YR 34	YR 35	YR 36	YR 37	YR 38	YR 39	YR 40	YR 41	YR 42	YR 43	YR 44	YR 45	YR 46	YR 47	YR 48	YR 49	YR 50	YR51	YR52	YR53
Outlet Notch liner removal	1,810	sq ft																											
Outlet Notch Excavation	7,000	CY																											
Outlet Rockfill Placement	3,250	CY																											
Outlet Rockfill Placement	250	CY																											
Downchute Excavation	200	ft																											
Outfall channel	500	ft																											
GM Stockpile																													
Disturbance	PP	NA																											
Restore Ground	566,280	sq ft																											
Restore Ground	653,400	sq ft																											
Restore Ground	827,640	sq ft																											
Restore Ground	2,439,360	sq ft																											
Restore Holly Ground	2,897,917	sq ft																											
Restore Hock Ground	4,595,080	sq ft																											
Plant Demolition																													
Disturbance	PP	NA																											
Demo Mill Site Buildings	665,122.00	LS														7000													
Decommision Mill	1.00	LS																											
Demo Concrete	434	CY																											
Bury Concrete	9,823	CY																											
Import GM	9,823	CY																											
Restore Ground	4,499,748	sq ft																											
Service/Construction Road Removal																													
Disturbance	PP	NA																											
Restore Ground	4,356,000	sq ft																											
Culverts to remove	950	ft																											
Haul Road Removal																													
Disturbance	PP	NA																											
Restore Ground	3,724,380	sq ft																											
Culverts to remove	2,650	ft																											
Powerline Removal																													
Disturbance	PP	NA																											
Remove Powerline	4.2	mile														4.2													
Pipeline Removal																													
Disturbance	PP	NA																											
Remove Pipeline	71,200	lin ft														40,700													
Surface water controls																													
Disturbance	PP	NA																											
Reveg sw ponds and misc. disturbance	50	ac														10													
Test sediments	15	samples																											
re-establish North Fork	1,907	ft																											
re-establish HGMC	1,845	ft																											
re-establish 601 drainage	374	ft																											
HGMC Detention/Diversion Structure																													
Disturbance	Yr 2	NA																											
Modify or Remove Embankment	67,360	CY							20000																				
Revegetation	378,972	sq ft																											
wells installed	PP	NA																											
wells to abandon	53	ea																											
Post-Closure Monitoring and Maintenance	Yr 5	NA																											
mine site monitoring annual maintenance-st	6	ea																											
mine site monitoring annual maintenance-lt	16	ea	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
pit sampling and monitoring	32	ea	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1										
Replace passive cell at JPAG	4	ea														2													
Number of GW sampling at mine site	459	ea	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
SW sampling annual cost for Mine	240	ea	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
TSF site monitoring annual maintenance -st	5	ea	0.4																										
TSF site monitoring annual maintenance - lt	14	ea		0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Replace passive cell at tsf site	1	ea																											
GW sampling annual cost for TSF	158	ea	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
SW sampling annual cost for TSF	52	ea	2	2	2	2	2																						

Table 6
Romarco Minerals - Haile Gold Mine
Reclamation and Closure Cost Estimates
Interim Quantity Annual Contribution

	Activity/Description	Interim Quantity Total	Unit	YR54	YR55	YR56	YR57	YR58	YR59	YR60	YR61	YR62	YR63+
	Outlet Notch liner removal	1,810	sq ft										
	Outlet Notch Excavation	7,000	CY										
	Outlet Rockfill Placement	3,250	CY										
	Outlet Rockfill Placement	250	CY										
	Downchute Excavation	200	ft										
	Outfall channel	500	ft										
GM Stockpile													
	Disturbance	PP	NA										
	Restore Ground	566,280	sq ft										
	Restore Ground	653,400	sq ft										
	Restore Ground	827,640	sq ft										
	Restore Ground	2,439,360	sq ft										
	Restore Holly Ground	2,897,917	sq ft										
	Restore Hock Ground	4,595,080	sq ft										
Plant Demolition													
	Disturbance	PP	NA										
	Demo Mill Site Buildings	665,122.00	LS										
	Decommision Mill	1.00	LS										
	Demo Concrete	434	CY										
	Bury Concrete	9,823	CY										
	Import GM	9,823	CY										
	Restore Ground	4,499,748	sq ft										
Service/Construction Road Removal													
	Disturbance	PP	NA										
	Restore Ground	4,356,000	sq ft										
	Culverts to remove	950	ft										
Haul Road Removal													
	Disturbance	PP	NA										
	Restore Ground	3,724,380	sq ft										
	Culverts to remove	2,650	ft										
Powerline Removal													
	Disturbance	PP	NA										
	Remove Powerline	4.2	mile										
Pipeline Removal													
	Disturbance	PP	NA										
	Remove Pipeline	71,200	lin ft										
Surface water controls													
	Disturbance	PP	NA										
	Reveg sw ponds and misc. disturbance	50	ac										
	Test sediments	15	samples										
	re-establish North Fork	1,907	ft										
	re-establish HGMC	1,845	ft										
	re-establish 601 drainage	374	ft										
HGMC Detention/Diversion Structure													
	Disturbance	Yr 2	NA										
	Modify or Remove Embankment	67,360	CY										
	Revegetation	378,972	sq ft										
	wells installed	PP	NA										
	wells to abandon	53	ea										13
Post-Closure Monitoring and Maintenance		Yr 5	NA										
	mine site monitoring annual maintenance-st	6	ea										
	mine site monitoring annual maintenance-lt	16	ea	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	pit sampling and monitoring	32	ea										
	Replace passive cell at JPAG	4	ea							2			
	Number of GW sampling at mine site	459	ea	9	9	9	9	9	9	9	9	9	9
	SW sampling annual cost for Mine	240	ea	4	4	4	4	4	4	4	4	4	4
	TSF site monitoring annual maintenance -st	5	ea										
	TSF site monitoring annual maintenance - lt	14	ea	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
	Replace passive cell at tsf site	1	ea			1							
	GW sampling annual cost for TSF	158	ea	2	2	2	2	2	2	2	2	2	2
	SW sampling annual cost for TSF	52	ea										

Appendix D

Attachment D

Reclamation Cost and Bond Assurance Calculations

This memorandum provides information about the assumptions and information used to estimate the reclamation costs and bond assurance calculations. Reclamation costs were estimated based on features and activities described in the Draft Project Description (submitted to the USACE on February 22, 2013) and the reclamation activities outlined in the Haile Mine Reclamation Plan (2013) (Reclamation Plan). The cost and bond assurance calculations were developed from the current mine plan and understanding of the South Carolina regulatory requirements for mine reclamation. Reclamation activities and bonding (financial assurance) requirements are subject to change due to changes in regulatory requirements imposed during the permitting process and/or during operations.

Haile Gold Mine, Inc. (Haile) will perform certain reclamation concurrent with mine operations as well as post mining. Haile considers the cost of concurrent reclamation activities, carried out during mining and that are tied directly with operational activities, to be an operational cost. For example, some of these activities would include backfilling of the pit with green overburden and lime amended yellow overburden; placement of saprolite on Johnny's PAG during construction, grading of OSA slopes during construction of the OSA, and seeding the TSF embankment immediately after construction. For this reason, these costs have not been considered bondable costs. Where financial assurance for a reclamation or closure activity is applicable, the cost has been applied to the financial assurance total.

It should be noted that the areas for reclamation presented in the Reclamation Plan are based on the three dimensional surface of the facility (OSAs, TSF) and may differ from the plan view (two-dimensional) areas identified in the Project Description. The costs are based on the three dimensional surface for reclamation.

The following sections provide the basis for the reclamation cost estimate for each of the facilities. First, each of the Tables providing reclamation costs is described. Second, the assumptions made for the reclamation of the facilities and the associated reclamation costs are summarized.

I. RECLAMATION AND BOND COST TABLES

The following provides a description of the tables developed to calculate the reclamation cost, financial assurance/bond costs, and release schedule. The sections below will describe each of the tables used to allow the reader to fully understand how the reclamation and closure costs were developed.

Table 1

Table 1 is linked to Table 2, Table 3 and Table 4 and provides a summary of the financial assurance/bond costs (Table 2) and the bond release schedule (Table 3). This table also identifies the cumulative financial assurance/bond outstanding/amount not yet approved for release by the regulatory agency. As shown in this table the highest financial assurance in place would occur during

Year 8 of the mining operation. After Year 8, facilities begin to be reclaimed and the projected financial assurance/bond being released exceeds the need to post additional assurance.

Table 2
Table 2 provides the estimated reclamation financial assurance/bond cost for each of the proposed mine facilities and the timing for which the financial assurance would be needed. The financial assurance would be required prior to construction of the facility. The term “operations begin” within the tables represents the year construction of a facility begins or excavation of a pit begins. Each facility that has a financial assurance/bond cost associated with it is shown on the left hand column (Facility) with the total associated financial assurance/bond cost shown in the next column to the right (Bond Assurance). The next column, Year Operations Begin, identifies when the particular facility would be constructed. The remaining columns to the right indicate the financial assurance amount and the year the monies would be in place.

Table 3
Table 3 provides the bond release schedule, which estimates when reclamation and closure activities would be completed and the amount of financial assurance/bond that would be released following completion of that activity and post closure monitoring for physical and chemical stability. The first column (Facility) provides the facility name or description. The second and third column provides the individual financial assurance/bond amount for each individual facility (i.e. Mill Zone Pit) and the total for each group of facilities (i.e. Pits), respectively. The next column to the right provides the Bonded Reclamation Costs. The next four columns provide the years for completion of earthworks, completion of revegetation, year of financial assurance release for earthworks, and year of final financial assurance/bond release. The remaining columns to the right show the estimated bond release for each year after mining begins.

The notations below the table title identifies the percentage of the bond release following completion of the earthworks (physical stability), which is 85%, and the percentage of bond release after post-closure monitoring (chemical stability), which is 15%. The table uses this 85/15 split for those facilities which will require monitoring or treatment. However, for facilities that do not have a chemical component (i.e., need monitoring or treatment), 100% of the bond is shown released after the physical stability is achieved. With respect to timing, the post closure monitoring for pit lakes starts after the water level within the pit reaches 95% of design/model capacity.

Table 4
Table 4 provides a cost breakdown for each of the proposed mine facilities. This table shows how the reclamation and financial assurance/bond amounts are calculated. The left hand column (Facility) identifies the facility being reclaimed. The next column to the right, Item, identifies the materials and activities needed for reclamation or closure activity of the facility. The columns to the right of the Items column provide the Quantity, Units for the quantity, and Rate associated with the material or activity. The rates for each activity are provided in Table 5 (Unit Costs), which is described below. The next column to the right, Bonded Cost, identifies the cost associated with the reclamation and closure activity for each facility.

Table 5

Table 5 provides the unit costs used in the Table 5 to calculate the reclamation cost and financial assurance/bond cost for each activity and facility. This table provides a description of the Item (activity or material used during reclamation), the unit cost for that item (Unit Cost column), the quantity unit (Per column), and a description of the source for the unit cost.

This table also identifies the percentage of the total bond amount used to calculate the indirect costs. An indirect cost for this project was set at 6% of reclamation and bond assurance calculations. The indirect cost includes those costs used to cover contract management, administrative cost, overhead, engineering and profit. A 6% indirect cost was chosen to more accurately represent the true indirect costs that would be incurred during the reclamation and closure of the Haile Gold Mine. A significant portion of the reclamation and closure costs are associated with the purchase of HDPE liner to cover Johnny's PAG and the TSF. Since HDPE liner cost is for the purchase of material, there would be very little indirect cost needed for this item. The 6% indirect cost identified currently in the bond estimate, would represent approximately 12% indirect costs if the liner were not included. Haile believes that there should be minimal indirect cost associated with the purchase of material. Most indirect costs are associated with engineering design, overhead and profit on labor, administrative costs for contracts and contract management.

To the extent feasible, the unit costs in Table 6 reflect data from 2013. In some instances, as noted, Haile obtained a price quote from a vendor or based the cost on generally available vendor information. Other cost sources routinely used in the industry were consulted, including:

- Cat Performance Handbook, 29th Edition was used for production rates, maintenance costs, and expendable costs (tires, fuel, etc). The Cat Performance Handbook is updated yearly with new equipment, updated maintenance requirements, and changes in production rates, if any.
- Labor rates used are South Carolina Davis Bacon Labor Rate obtained from the Wage Determinations OnLine.gov website for 2013 wages. http://www.wdol.gov/dba.aspx
- RS Means Cost Data Online, 2013. RS Means provides yearly updated cost for a wide range of construction activities. This source is used as a means of estimating costs construction and demolition cost.
- Standardized Reclamation Cost Estimator (SRCE) using the 2013 User Data File. Many of the equipment costs and production rates within the Haile cost estimate were taken from the SRCE. The SRCE is a cost estimating tool developed cooperatively by the US Bureau of Land Management, the Nevada Division of Environmental Protection, and the mining industry. Every year the User Cost Data File (unit cost data) is updated with revised yearly costs for equipment, labor and materials. Formulas within the spreadsheet use the User Cost Data File along with site specific data (disturbance areas, material type, slopes, seed mix, etc.) to calculate the reclamation bond costs. In Nevada, because the agencies have approved the SRCE methodology, and approve the User Cost Data File annually, review times for bond costs are significantly shortened.

Contingency costs were not included in the bond estimate to account for yearly changes in equipment rates, material costs, and labor rates, as it is assumed the reclamation bond estimate would be reviewed and updated on a regular basis to account for changes in unit costs. Any additional contingency needed would be covered by the indirect cost rate.

Table 6

Table 6 is used to identify the timing for the reclamation and closure activities. The quantities for each of the reclamation and closure activity are input in this table in the Year column corresponding to the year that activity would be conducted. The cumulative quantities for each activity are then used in Table 4 Cost Breakdown to determine the cost for each reclamation and closure activity. The quantity numbers in this table have been developed from a number of sources including, but not limited to, the Reclamation Plan, facility designs, Haile's mine plan, geochemical modeling, and hydrologic and hydrogeologic modeling.

The first column (Line Item Code) is used as an identifier for links in the other tables associated with the cost estimate spreadsheet. The Activity/Description column identifies the reclamation or closure activity. The next two columns, Interim Quantity Total and Unit, provide the cumulative quantity for the reclamation and closure activity and the units associated with that quantity, respectively. All the other columns represent the specific years associated with activity at the Haile Gold Mine. The time designated as "PP" represents the Pre-Production years during initial facility development. Year 1 represents the first year of ore production and processing.

II. RECLAMATION AND CLOSURE ASSUMPTIONS

The activities that will occur as part of reclamation are described more fully in the Reclamation Plan and summarized here for purposes of understanding the costs and financial assurance calculations.

Open Pits

The open pits associated with the Haile Gold Mine will either be backfilled (four) or allowed to fill with water to form a pit lake (three, plus the Snake Pit which is partially backfilled and becomes part of the Ledbetter/Snake Pit Lake). Backfilling of the pits is based on the timing associated with the mine operations. Pits that are to be backfilled are those which are developed early in the mining operation. Thus, overburden from the pits developed later in the mine life can be used to backfill the earlier mined pits. The assumptions used for development of the reclamation plan and cost estimate for each of the pits are provided below.

Mill Zone Pit

- Completely backfilled with green and yellow overburden, minimum five foot saprolite layer on top of overburden, no yellow overburden above the water table, green overburden to approximate original topography
- Backfill activity is an operational cost
- Lime addition in backfill is an operational cost
- Grading of backfill is a reclamation cost
- Six inches of growth medium cover is included to support vegetation growth
- Revegetate with an approved seed mix

- Pit area for revegetation is approximately 47 acres

The total financial assurance/bonding cost for the Mill Zone Pit is $189,772.

Haile Pit

- Completely backfilled with green and yellow overburden, minimum five foot saprolite layer on top of overburden, no yellow overburden above the water table, green overburden to approximate original topography
- Backfill activity is an operational cost Lime addition in backfill is an operational cost
- Grading of backfill is a reclamation cost
- Six inches of growth medium cover is included to support vegetation growth
- Revegetate with an approved seed mix
- Pit area for revegetation is approximately 40 acres

The total financial assurance/bonding cost for the Haile Pit is $161,508.

Red Hill Pit

- Completely backfilled with green and yellow overburden, minimum five foot saprolite layer on top of overburden, no yellow overburden above the water table, green overburden to approximate original topography
- Backfill activity is an operational cost
- Lime addition in backfill is an operational cost
- Grading of backfill is a reclamation cost
- Six inches of growth medium cover is included to support vegetation growth
- Revegetate with an approved seed mix
- Pit area for revegetation is approximately 36 acres

The total financial assurance/bonding cost for the Red Hill Pit is $145,357.

Chase Pit

- Completely backfilled with green and yellow overburden, minimum five foot saprolite layer on top of overburden, no yellow overburden above the water table, green overburden to approximate original topography
- Backfill activity is an operational cost Lime addition in backfill is an operational cost
- Grading of backfill is a reclamation cost
- Six inches of growth medium cover is included to support vegetation growth
- Revegetate with an approved seed mix
- Pit area for revegetation is approximately 23 acres

The total financial assurance/bonding cost for the Chase Pit is $92,867.

Snake Pit

- Partial backfilled with green backfill only
- Backfill activity is an operational cost
- Remainder of pit to become part of Ledbetter Pit lake
- Grading of top of backfilled area is a reclamation cost.
- Construction and grading of the slopes is part of operational costs.
- Six inches of growth medium cover is included to support vegetation growth

- Revegetate with an approved seed mix
- Pit area for revegetation is approximately 36 acres
-

The total reclamation and financial assurance/bonding cost for the Snake Pit is $145,357.

Ledbetter Pit

- Pit will remain open to form a pit lake (no backfill)
- Safety berm constructed – the length of the safety berm assumes 90% of the pit has a berm during operations and that 10% of perimeter needs berm at the time of reclamation and closure. This 10% represents the area where the access road enters the pit during operations.
- Inlet and outlet of pit for Haile Gold Mine Creek would be improved to minimize erosion
- An ecological risk assessment (ERA) would be completed for the Ledbetter Pit lake in year 33
- The addition of lime to the pit lake would be required for approximately 13 years starting in Year 13 of the Mine Schedule
- A total of 15,968 tons of lime would be required over the 13 year span

The total reclamation and financial assurance/bonding cost for the Ledbetter Pit is $2,926,449.

Small Pit

- Pit will remain open to form a pit lake (no backfill)
- Safety berm constructed – the length of the safety berm assumes 90% of the pit has a berm during operations and that 10% of perimeter needs berm at the time of reclamation and closure. This 10% represents the area where the access road enters the pit during operations.
- An ecological risk assessment (ERA) would be completed for the Small Pit lake in year 33. The cost for the ERA is included in the Ledbetter Pit costs
- The addition of lime to the pit lake would be required at a minimum through 63 years starting in Year 13 of the Mine Schedule
- A total of 912 tons of lime would be required over the 50 year span

The total reclamation and financial assurance/bonding cost for the Small Pit is $174,388.

Champion Pit

- Pit will remain open to form a pit lake (no backfill)
- Safety berm constructed – the length of the safety berm assumes 90% of the pit has a berm during operations and that 10% of perimeter needs berm at the time of reclamation and closure. This 10% represents the area where the access road enters the pit during operations.
- An ecological risk assessment (ERA) would be completed for the Champion Pit lake in year 33. The cost for the ERA is included in the Ledbetter Pit costs
- The addition of lime to the pit lake would be required for approximately 17 years starting in Year 12 of the Mine Schedule
- A total of 4,543 tons of lime is estimated over the 17 year span

The total reclamation and bonding cost for the Champion Pit is $833,476.

Overburden Storage Areas (OSA)

All of the overburden storage areas except Johnny's PAG will contain green classified overburden. The development of the individual OSAs will include interbench slopes of 2.5H:1V and an overall side slope of 3H:1V. Reclamation of the OSAs containing green overburden will include development of channels (downchutes) along the down slopes of the OSA to collect runoff from the top surface and slopes and direct the runoff into permanent channels which will lead to natural or reconstructed drainage channels. Six inches of growth media is planned for use on the OSAs containing green overburden to support successful revegetation. The OSAs will be revegetated using an approved seed mix.

Johnny's PAG will contain all remaining yellow overburden not placed as backfill material in the backfilled pits and all red classified overburden. During construction and operation of Johnny's PAG, a saprolite cover will be placed concurrent with operations to limit air and water entry during operations. Following placement of the final lift and saprolite cover, reclamation activities will begin. Reclamation of the Johnny's PAG will include installation of a geosynthetic cover, and growth medium followed by revegetation. Concurrent reclamation of all these facilities will be conducted to the extent possible. The assumptions used for development of the reclamation plan and cost estimate for each of the OSAs are provided below.

Johnny's PAG

- Constructed with alternating benches with overall slope of 3:1
- Inter-bench slopes will be 2.5:1
- 20 foot thick saprolite layer on outer slopes placed during construction
- Assume no grading is needed at ultimate configuration – grading is part of operational cost
- Johnny's PAG will be built in two phases. Phase I represents approximately 60 percent of the total surface area disturbed by the total footprint of the facility. The bonding costs are representative of the reclamation costs for each phase of Johnny's PAG and when those phases would be constructed.
- 5 foot thick saprolite layer on upper surface
- Smooth roll the saprolite layer to minimize larger materials from puncturing liner
- Construct downchutes along slopes to manage stormwater
- HDPE textured liner over saprolite layer(s)
- 2 foot thick growth medium layer
- Revegetation with approved seed mix
- Revegetation area is approximately 169 acres
- Water treatment for drain down from Johnny's PAG is not included in the financial assurance/bonding cost
- Create a passive treatment system following reduction in drain down; cost is included in financial assurance/bonding amount.

The total reclamation and bond cost for Johnny's PAG $7,302,251.

601 OSA

- All material removed for construction of TSF embankment
- Regrade surface assuming 1 foot grading depth – operational cost
- Six inches of growth medium placed
- Revegetate surface with an approved seed mix
- Revegetation area is approximately 42 acres

The total reclamation and bond cost for the 601 OSA is $149,724.

Ramona OSA

- Facility constructed during operations to final slope – no grading required
- Scarify flat surface area – operational cost
- Construct downchutes to manage stormwater
- Six inches of growth medium placed
- Revegetate surface with an approved seed mix
- Revegetation area is approximately 160 acres

The total reclamation and bond cost for Ramona's OSA is $761,956.

Hilltop OSA

- Facility constructed during operations to final slope – no grading required
- Scarify flat surface area – operational cost
- Construct downchutes to manage stormwater
- Six inches of growth medium placed
- Revegetate surface with an approved seed mix
- Revegetation area is approximately 66 acres

The total reclamation and bond cost for Hilltop OSA is $306,339.

Hayworth OSA

- Facility constructed during operations to final slope – no grading required
- Scarify flat surface area – operational cost
- Construct downchutes to manage stormwater
- Six inches of growth medium placed
- Revegetate surface with an approved seed mix
- Revegetation area is approximately 91 acres

The total reclamation and bond cost for Hayworth OSA is $422,978.

Robert OSA

- Facility constructed during operations to final slope – no grading required
- Scarify flat surface area – operational cost
- Construct downchutes to manage stormwater
- Six inches of growth medium placed
- Revegetate surface with an approved seed mix
- Revegetation area is approximately 85 acres

The total reclamation and bond cost for Robert OSA is $378,948.

James

- Facility constructed during operations to final slope – no grading required
- Scarify flat surface area – operational cost
- Construct downchutes to manage stormwater
- Six inches of growth medium placed

- Revegetate surface with an approved seed mix
- Revegetation area is approximately 70 acres

The total reclamation and bond cost for James OSA is $324,778.

Tailing Storage Facility

The tailing storage facility (TSF) will contain the crushed spent ore from the milling process. The TSF will be located north of the Mill Site and will be a four-sided ring dike configuration. The TSF will be constructed in four stages using downstream construction techniques. Closure and reclamation of the TSF will begin following shut down of the milling and processing plant. Water remaining on the surface of the facility and underdrain flow will be treated and discharged. Concurrent reclamation on the embankment slopes will be completed during operations, but reclamation of the surface would not be started until cessation of processing activities. Haile will complete a dry closure of the tailings storage facility by isolating exposure of the tailings to precipitation by installing a geosynthetic membrane over the tailings. The assumptions used for development of the reclamation plan and cost estimate for the TSF are provided below.

- Embankment constructed with final reclamation slope thus no grading of slope required at closure
- Revegetate downstream embankment and crest. Embankment revegetation will be conducted during operations and thus is an operational cost.
- Place and grade an average of three feet of coarse rock over approximately 3,399,175 square feet, which is assumed to be the area of the Reclaim Pond during operations. This area is assumed to require coarse material to stabilize the surface to allow access for closure.
- Smooth roll the area where coarse material was placed to ensure no rocks projections that could puncture the liner. Assume two passes over the area.
- Place HDPE liner over tailing material and tie into existing liner
- Place two feet of growth medium over the HDPE liner
- Revegetate with an approved seed mix
- Excavate and construct outlet notch through embankment
- Excavate and construct outflow channel from embankment notch down embankment slope
- Construction of a passive treatment cell (within the Underdrain Collection Pond) for long-term treatment of drain down water
- Replace passive treatment cell media once after 20 years
- Revegetation area is approximately 396 acres

The total reclamation and bond cost for the TSF is $15,278,755.

Mill Site/Building Demolition

- Mill site would be decommissioned, which would include rinsing all tanks and pipes, removal of existing chemicals, and general cleaning prior to demolition
- All remaining building materials would be demolished and material removed from site for recycling or disposal
- No salvage value for equipment or buildings included in reclamation cost
- Building foundations will be broken in place and covered with a minimum of 2 feet of cover
- Two feet of growth medium will be placed on top of the cover material over the buried foundations at the Mill Site

- Revegetate approximately 103 acres of area associated with the Mill Site with an approved seed mix

The total reclamation and bond cost for reclaiming the Mill Site is $954,093.

Service and Construction Roads

- Grade the existing roads and berms to blend with surrounding topography
- Scarify compacted road base (100 acres)
- Remove approximately 950 feet of culverts
- Revegetate with an approved seed mix
- Approximately 100 acres to revegetate

The total reclamation and bond cost for reclaiming service and construction roads is $241,496.

Haul Roads

- Grade the existing roads and berms to blend with surrounding topography
- Scarify compacted road base (85.5 acres)
- Remove approximately 2,650 feet of culverts
- Revegetate with an approved seed mix
- Approximately 85.5 acres to revegetate

The total reclamation and bond cost for reclaiming haul roads is $228,686.

TSF Borrow Areas (Holly and Hock)

Disturbance associated with the Holly and Hock TSF Borrow Areas will be reclaimed immediately following removal of material needed for construction of the TSF.

- Final contours will be constructed during operation of the borrow area
- Revegetate with an approved seed mix
- Approximately 172 acres to revegetate

The total reclamation and bond cost for reclaiming the borrow areas is $280,740.

Stream Reconstruction

Three streams/drainages will require reconstruction either during operations or during final reclamation and closure. These streams are Haile Gold Mine Creek from the Ledbetter Pit to the confluence with the North Fork; North Fork from above the south pit complex to below the south pit complex; and an unnamed tributary located where the 601 OSA is located. Restoration of North Fork Creek and Haile Gold Mine Creek will be conducted following backfilling of the South Pit Complex. The reconstruction of the unnamed tributary will be conducted following removal of the 601 OSA. The creek reconstruction will involve designing and constructing a stream channel to connect the undisturbed reach above the pits to the undisturbed downstream channel of Haile Gold Mine Creek.

- North Fork Creek restored in year 8
- Haile Gold Mine Creek restored in year 12
- Unnamed tributary restored in year 7
- Approximately 4126 feet of stream restoration will be required

The total reclamation and bond cost for creek restoration is $984,051.

Miscellaneous Demolition

- 71,200 feet of pipeline
- All pipelines removed at final closure and reclamation
- Pipeline demolition would consist of cutting the pipe, hauling and disposal
- 4.2 miles of powerline
- Assume all Haile owned on-site powerlines will be removed at final closure and reclamation

The total reclamation and bond cost for removal of all pipelines and powerlines is $334,467.

Surface Water Management – Ponds and Stormwater controls

Many of the diversion channels that will be constructed to divert runoff around the facilities will remain in place following closure and reclamation. These structures will be inspected to ensure long term stability following closure. All HDPE lined ponds and/or stormwater ponds and channels not needed following cessation of mining will be reclaimed. The following provides the assumptions made for the reclamation of the ponds and channels.

- Channels no longer needed will be graded and revegetated
- All ponds will be regraded except for the three ponds that will be converted to passive treatment systems for Johnny's PAG (465 and 469 Ponds) and the TSF (Underdrain Collection Pond)
- Water will be managed appropriately. Non-contact stormwater ponds may be drained while contact water will be treated and discharged.
- Sediments in HDPE lined ponds will be tested to determine proper management
- If necessary, sediments will be removed and placed on Johnny's PAG or in the TSF
- Decommissioned HDPE liners within ponds will be cut, folded in and buried
- Surfaces will be graded
- Revegetate with an approved seed mix
- Assume 50 acres of pond and channel disturbance

The total reclamation and bond cost for reclaiming ponds and channels $110,430.

Growth Media Stockpiles

It is anticipated that all of the stockpiled growth media would be used during reclamation of the mine site. However, if some growth media is not used, it would be reclaimed in place and would not be moved. Areas where growth media has been stored and used would be reclaimed as provided below.

- Scarify the surface only, no grading needed
- Revegetate with an approved seed mix
- Approximately 103 acres of disturbance for revegetation

The total reclamation and bond cost for reclaiming the growth media stockpiles is $188,224.

Existing Leach Pads and Hilltop 1 Pit

There are a number of existing facilities from the previous mining operations. These facilities are currently in closure but will be either removed or covered up during the proposed mining operation. As part of the proposed operation, material from the existing Chase Hill and South leach pads will be moved to Johnny's PAG. In addition, the former sericite Hilltop 1 Pit will be backfilled and reclaimed. Both the removal of leach material from the Chase Hill and South leach pads to Johnny's PAG, and the backfill of the Hilltop Pit will be an operational expense and thus no reclamation costs have been allocated. No new financial assurance is included as these are existing reclamation facilities with a financial assurance/bond already in place.

- Material removed from the two existing leach pads and moved to Johnny's PAG as part of operational cost
- Hilltop 1 Pit will be backfilled and reclaimed
- The cost for backfilling is part of the operational cost

There will be no reclamation and financial assurance/bond cost for reclaiming areas of previous disturbance as a financial assurance/bond is already in place.

Haile Gold Mine Creek Detention and Diversion Structure

Following cessation of mining in the Ledbetter Pit, the Haile Gold Mine Creek Detention and Diversion Structure will be removed or modified to function as a low head dam, which will allow Ledbetter Pit to fill with water from groundwater recharge, rainfall, and diverted flows from Haile Gold Mine Creek. Once full, the Haile Creek Diversion Structure will no longer be required and will be removed. Haile Gold Mine Creek will then flow through Ledbetter Pit.

- Diversion structure will be removed and or converted to a low-head dam to allow filling of Ledbetter Pit
- Grade the embankment to blend with the surrounding topography. Assuming grading of the entire volume of fill used for the structure
- Scarify and revegetate area
- Approximately 8.7 acres will require revegetation using an approved seed mix

The total reclamation and bond cost for reclaiming the area associated with the diversion structure is $42,317.

Well Abandonment

It is assumed that after cessation of mining, reclamation, and post closure monitoring that all wells will be abandoned in accordance with state regulations. Many of the wells will be abandoned immediately following cessation of mining, as depressurization wells for the pits will no longer be needed. Monitoring wells would be required through the post-closure monitoring period.

- Assumed 53 depressurization wells, monitoring wells and peizometers
- 40 wells including all depressurization wells will be abandoned in year 12 at cessation of mining
- Assumed 13 monitoring wells will remain until the end of post-closure monitoring in year 63

The total reclamation and bond cost for abandonment of wells is $156,742.

Post-Mining Monitoring and Maintenance

- Assume 10% of revegetated area at TSF and JPAG requires secondary seeding (part of maintenance costs)
- Assume 5% of areas at TSF and JPAG needs to be repaired with growth media due to erosion (part of maintenance costs)

- Short term maintenance would consist of quarterly site visits to inspect revegetation success, stability and erosion control measures, and conduct sampling. Short term maintenance activities would be conducted for 10 years beginning with the reclamation of Johnny's PAG. Since many of the facilities will already be reclaimed, most of the focus during the short-term maintenance period will be on Johnny's PAG, the Mill Site, and other facilities reclaimed since the end of mining. Short term maintenance would consist of quarterly visits for two people. These visits would be conducted at the same time as for the TSF maintenance activity and would use the same staff. Costs assume 60% of the time for each visit spent at the mine site and 40% of the time at the TSF.
- Long term maintenance of the mine site would be continued until year 63 (which is 30 years beyond when the modeling indicates the pit lakes will reach 95% of the expected water elevation). Long term maintenance will consist of 1 annual visit per year for two people to conduct the site water sampling. These visits would be conducted at the same time as for the TSF maintenance using the same staff. Assumed 60% of the time for each visit at the mine site and 40% of the time at the TSF.
- Short term maintenance time frame for the TSF would be 13 years following the beginning of closure activities for the TSF, with the last year of short-term maintenance occurring five years after final closure activity at the TSF. Five years beyond the final reclamation activity was chosen to ensure sufficient monitoring during the most critical years of vegetation establishment and ensure stability at the embankment notch and downchute. Short term maintenance would consist of quarterly visits for two people. These visits would be conducted at the same time as for the mine site maintenance using the same staff. Assumed 60% of the time for each visit at the mine site and 40% of the time at the TSF.
- Long term maintenance at the TSF would be continued until year 63 when all site monitoring is expected to be complete. Long term maintenance at the TSF would provide personnel to conduct surface and ground water monitoring and monitoring of the passive treatment system. The long term maintenance will consist of 1 annual visit per year for two people. These visits would be conducted at the same time as for the mine site maintenance using the same staff. Assumed 60% of the time for each visit at the mine site and 40% of the time at the TSF.
- Replace passive treatment cell material every 20 years through year 63 (two cells replaced for Johnny's PAG and one cell replacement for the TSF)
- Assume a total of 459 groundwater samples, 240 surface water samples, and 32 pit lake samples collected through the post-closure monitoring period for the mine site
- Assume 158 groundwater and 52 surface water samples collected through the post-closure period for the TSF

The total estimated reclamation and bond cost for post-closure monitoring and maintenance is $1,648,830.

Additional Assumptions

The following provides additional assumptions that were made in the development of the reclamation and bond cost:

- Moving of overburden is an operational expense. The opportunity of placing green and yellow overburden in pit backfills is therefore considered an operational activity and the cost is not included in reclamation cost calculation or financial assurance/bond numbers.

- Since lime is added to the yellow overburden at the time the lime amended yellow overburden is placed as pit backfill, the cost of the lime is included in mine operating costs and not part of reclamation or financial assurance/bond.
- Safety berms around the pits will be maintained for Snake-Ledbetter, Champion and Small pits. In addition, signs will be installed around the pits indicating a safety hazard.
- Overhead (indirect cost) of 6% was included for all reclamation and bond assurance calculations to cover contract management, administrative cost, overhead, engineering and profit. A 6% indirect cost was chosen primarily due to the cost of liner as it relates to the overall bond cost. The 6% indirect cost identified currently in the bond estimate, would represent approximately 12% indirect costs if the liner were not included. The majority of the cost for liner is associated with the actual cost of the material. Haile believes that there should be minimal indirect cost associated with the purchase of material. Most indirect costs are associated with engineering design, overhead and profit on labor, administrative costs for contracts and contract management.
- Bond assurance amounts would generally be released according to the following schedule:
    - 85% of the bonded amount for the facility would be released upon demonstration of physical stability and sustained vegetation for two consecutive growing seasons.
    - 15% of the bonded amount for the facility would be released following demonstration of chemical stability (acceptable water quality) after the completion of facility reclamation and post-closure monitoring.

<u>Total Reclamation and Bond Cost</u>

The estimated total bond cost for reclamation and closure activities at the Haile Gold Mine is approximately $34,764,979. Following initial bond placement, Haile will adjust the bond prior to facilities being constructed. Table 3 presents the estimated bond release timing calculations. Overtime, Haile will be able to request release of bond monies at the same time as new facilities are being permitted, thus the bonding should plateau in Year 8 as indicated.

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